PB89-196786

Superfund Record of Decision (EPA Region 5) Kummer Sanitary Landfill, Beltrami County, Minnesota (Second Remedial Action) September 1988

(U.S.) Environmental Protection Agency, Washington, DC

30 Sep 88

U.S. Department of Commerce
National Technical Information Service

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

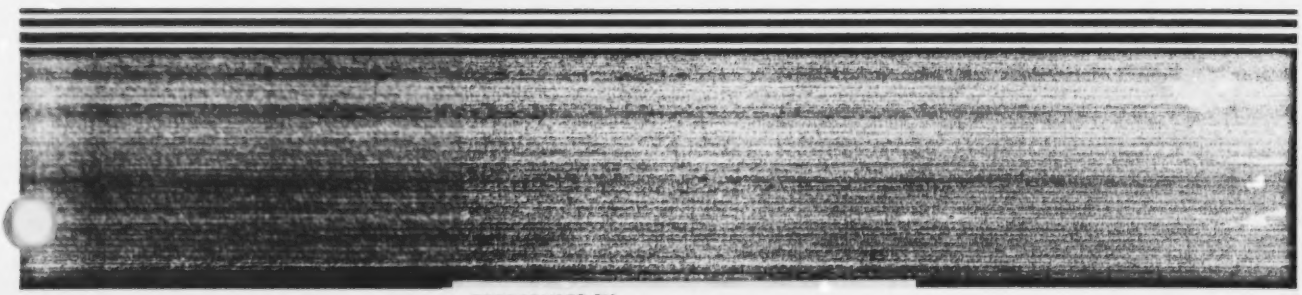
EPA/ROD/R05-88/082
September 1988

PB89-196786

EPA

Superfund Record of Decision:

Kummer Sanitary Landfill, MN



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Kummer Sanitary Landfill, MN
Second Remedial Action

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401 M Street, S.W.
Washington, D.C. 20460

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14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)
The Kummer Sanitary Landfill is a 40-acre site located in Northern Township, Beltrami County, Minnesota. The site consists of a 35-acre landfill and the Kummer residence located in the extreme southeast corner of the property. To the north and west of the site, the land is sparsely settled with farm residences. A large residential community lies about 1,000 feet to the east and west, and the City of Bemidge is located 0.5 mile south of the site. The city uses ground water for its drinking water; its wells are 0.25 mile west of the site. There are numerous wetlands and lakes within the area of the site. Between 1971 and 1983 the site operated as a sanitary landfill, accepting mixed municipal waste. Landfill operations consisted of excavating trenches, filling the trenches with waste materials, and covering the fill with onsite sand and gravel deposits. The trenches may have been excavated to the water table and the waste placed in direct contact with ground water. Beginning in 1974, demolition debris consisting of fly ash and sawdust were disposed of onsite. In 1982 and 1983 the Minnesota Pollution Control Agency sampled ground water from onsite monitoring wells and discovered 19 VOCS including TCE, PCE, and benzene. In 1984, VOCs were also discovered in offsite shallow residential wells downgradient of the site; consequently, in 1985 the site was ordered closed. In June 1985 a ROD was signed to provide an alternate water supply to
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Kummer Sanitary Landfill, MN
Second Remedial Action
Contaminated Media: gw, soil
Key Contaminants: VOCs (benzene, PCE, TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report) None
21. No. of Pages 65
20. Security Class (This Page) None
22. Price PB89158956.95

EPA/ROD/R05-88/082
Kummer Sanitary Landfill, MN
Second Remedial Action

16. ABSTRACT (continued)

approximately 244 homes affected by contaminated ground water. Although there is no documentation of hazardous waste disposal at the site, it is believed that small quantities of wastes such as paint thinner, solvents, and pesticides were included in municipal wastes. The primary contaminants of concern affecting ground water and soil are VOCs such as TCE, PCE and benzene.

The selected remedial action for this site includes: site grading and consolidation of soil and other waste material; placement of a sloping foundation layer of natural soil fill; capping with a cover system consisting of a gas control layer, a barrier layer of low permeability material (clay or flexible synthetic membrane), and a drainage layer with placement of cover soil and a vegetative layer; access and deed restrictions limiting future site use; and groundwater and landfill gas monitoring. The estimated capital cost of the selected remedy is $7,400,000 to $12,500 for the clay cap and $6,900,000 to $11,200,000 for the synthetic membrane, with annual O&M costs of $35,000 and $33,000, respectively.

Record of Decision

Site Name and Location

Kummer Sanitary Landfill
Northern Township, Beltrami County, Minnesota

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Kummer Sanitary Landfill site in Northern Township, Beltrami County, Minnesota, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the National Contingency Plan. The Minnesota Pollution Control Agencys' decision is based on the Minnesota Environmental Response and Liability Act of 1983.

This decision is based upon the administrative record for the Kummer Sanitary Landfill site. The index of the administrative record is attached.

The State of Minnesota and the U.S. Environmental Protection Agency (EPA), each and independently, concur and adopt the selected remedy.

Description of Selected Remedy

The selected remedial alternative for the Kummer Sanitary Landfill site is a source control operable unit to cover the landfill with a low permeability cap and to undertake other actions consistent with state sanitary landfill closure requirements. The major components of the selected remedial alternative are:

- Site grading and consolidation of waste material.
- Placement of a sloping foundation layer of 1-15 feet of existing and proposed natural soil fill.
- Capping with a cover system consisting of a 0.5 feet gas control layer, a 2.0 foot barrier layer of low permeable material (clay) or a 0.30 millimeter flexible membrane, and a 1.0 foot drainage layer.
- A 1.5 foot topsoil, cover soil, and vegetation layer to provide protection of the drainage and barrier layers.
- Site deed restrictions limiting future use of site.
- Fencing to restrict access to the site.
- Long-term operation and maintenance to provide inspections and repairs to the landfill cap.

The following component will be evaluated during the remedial design:

- Determination whether a low permeability material (clay) or a flexible, synthetic membrane liner is best suited for use as the barrier layer.

This action will require operation and maintenance activities to ensure continued effectiveness of the remedial measures.

The action being taken is consistent with Section 121 of CERCLA as amended by SARA, 42, U.S.C. §9621. The State of Minnesota has been consulted and concurs with the selected remedy.

Declaration

The selected remedy is protective of human health and the environment and attains federal and state requirements that are applicable or relevant and appropriate to this remedial action and is cost-effective.

This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Treatment of the principal threats of the site, however, was not found to be practicable; this remedy does not employ treatment as a principal element of the remedy.

Because this remedy will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Francis M. Covington for 9/30/88

Valdas V. Adamkus
Regional Administrator
U.S. Environmental Protection Agency, Region V

Date

Gerald L. Willet 9-29-88

Gerald L. Willet
Commissioner
Minnesota Pollution Control Agency

Date

Minnesota Pollution Control Agency

September 29, 1988

Mr. Valdas Adamkus
Regional Administrator
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Adamkus:

RE: Record of Decision, Kummer Sanitary Landfill

Enclosed for your consideration are two copies of the Declaration and one copy of the Record of Decision (ROD) for the Kummer Sanitary Landfill (Site). This ROD was jointly drafted by staff of the Minnesota Pollution Control Agency (MPCA) and the U.S. Environmental Protection Agency (EPA), Region V.

The ROD selects a landfill cover system and other physical and institutional controls at the Site to reduce the production of leachate and restrict access to the Site. The remedy selected is based upon information considered in the feasibility study conducted by the MPCA and funded through the Multi-Site Cooperative Agreement between the MPCA and the EPA.

Upon execution of the ROD with your signature, please return one original copy of the Declaration to Joseph Hibberd of my staff.

MPCA staff appreciates the cooperation and assistance of your staff, particularly Mr. Allen Wojtas, in the preparation of this ROD. If you have any questions regarding the document, please contact Douglas Day, Superfund Unit Supervisor at 612/297-1780.

Sincerely,

Gerald L. Willet

Gerald L. Willet
Commissioner

GLW:wjc
Enclosures
cc: Ms. Cindi Wakat, EPA
Mr. Allen Wojtas, EPA

Phone:_____
520 Lafayette Road, St. Paul, Minnesota 55155
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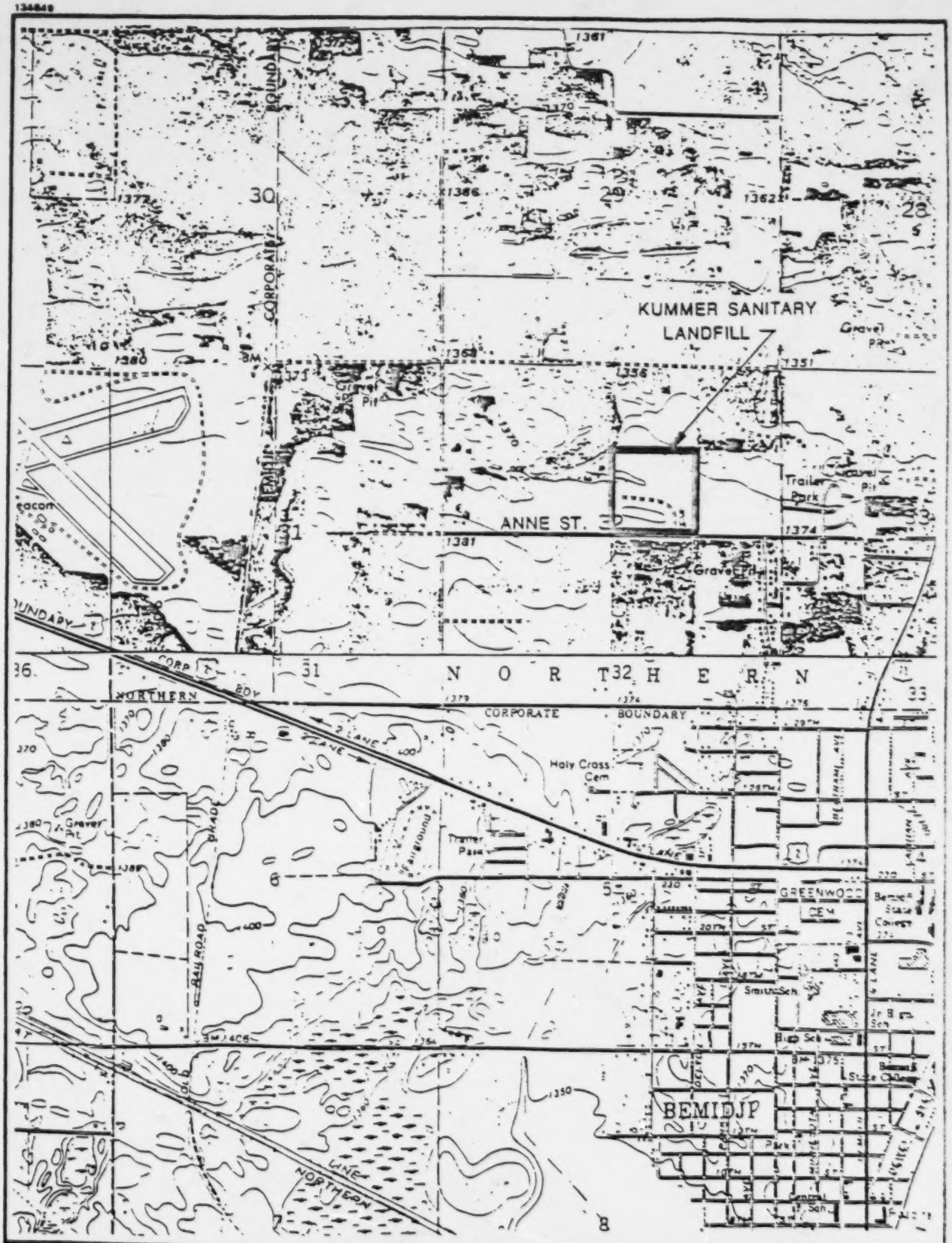


MALCOLM PIRNIE

SITE LOCATION
KUMMER SOURCE CONTROL FEASIBILITY STUDY
MINNESOTA POLLUTION CONTROL AGENCY

MALCOLM PIRNIE, INC.

FIGURE 1

I. SITE NAME, LOCATION AND DESCRIPTION

The Kummer Sanitary Landfill is located in Northern Township, Beltrami County, Minnesota, approximately one mile west of Lake Bemidji. The site is located along the north side of Anne Street, N.W., and midway between U.S. 71 and County State-Aid Highway 15. The northern corporate limits of the City of Bemidji are one-half mile south of the site (Figure 1).

Northern Township has a population of 4,095 (1986 data) and is generally sparsely populated. Most of the township residents live in the southeastern section of the township near the City of Bemidji and along the western shore of Lake Bemidji. To the north and west of the site the land is sparsely settled with farm residences and other isolated buildings. The closest residential building is the Kummer residence located on-site in the extreme southeast corner of the property. A large residential community lies approximately 1,000 feet farther to the east and south. A mobile home park is located one-quarter mile to the east and a hospital is located directly southwest of the landfill.

The landfill property is over 40 acres in size with approximately 35 acres of the site landfilled. The landfill has relatively steep outslopes and a gentle sloping to flat upper surface. It is poor to moderately well vegetated. The landfill cover material was obtained from the extreme northern portion of the site from on-site sand and gravel deposits. The cover may, therefore, be very permeable.

The region is characterized by flat to gently rolling terrain to the north and gently rolling terrain to the south. Surface elevations range from approximately 1,050 to 1,550 feet above mean sea level (MSL). The area contains numerous wetlands and lakes. Prior to agricultural drainage, approximately one-half of Beltrami County was comprised of wetland. Mineral resources of the county consist primarily of aggregate sand and gravel, and peat.

The terrain in the immediate vicinity of the site is very gently rolling. The site is bounded on the east and west by pasture and/or grain croplands, on the north by woodlands and a bog, and on the south by planted woods and a gravel pit. Surface elevation at the site ranges from about 1,360 to 1,380 feet above MSL. Local surface drainage is generally northward. Approximately one-half mile to the north, a modified stream channel or ditch carries runoff to Lake Bemidji.

The Kummer Sanitary Landfill is located within the Mississippi River Headwaters Watershed. Water resources in the area are considered abundant, with lakes and streams occupying about eight percent of the regional surface area. Stream flow is fairly regular because of storage in lakes, swamps, and glacial deposits. Average annual runoff from the watershed is about 5.34 inches.

The ground water reservoir contains the largest quantity of water available within the area. Ground water discharge provides at least part of the base flow of streams and uniform lake stages. Glacial outwash deposits underlying the present surface water courses are highly productive. Additional ground water is also available from buried valleys filled with glacial deposits and from Precambrian sedimentary rock.

The landfill site is underlain by glacial outwash deposits of sand and gravel mixed with some silt and clay, and with interbedded layers of sand and gravel laid down by glacial meltwater streams. The sands of the glacial outwash deposits continue approximately 100 feet below the average site elevation. Well logs from domestic wells located within two or three miles of the site indicate the top of a clay layer at a depth of 36 to 45 feet. Discontinuous clay lenses encountered at some locations within the site do not appear to be confining units as shown in the geologic cross section in Figure 2.

Ground water in the glacial outwash sands flows generally to the east, where it eventually discharges into Lake Bemidji. An approximate ground water velocity of 0.3 to 3 feet per day is calculated from an estimated hydraulic conductivity of 100 to 1,000 feet per day for the outwash sands of the aquifer. The hydraulic gradient of the water table ranges from 0.0024 ft/ft to 0.0030 ft/ft.

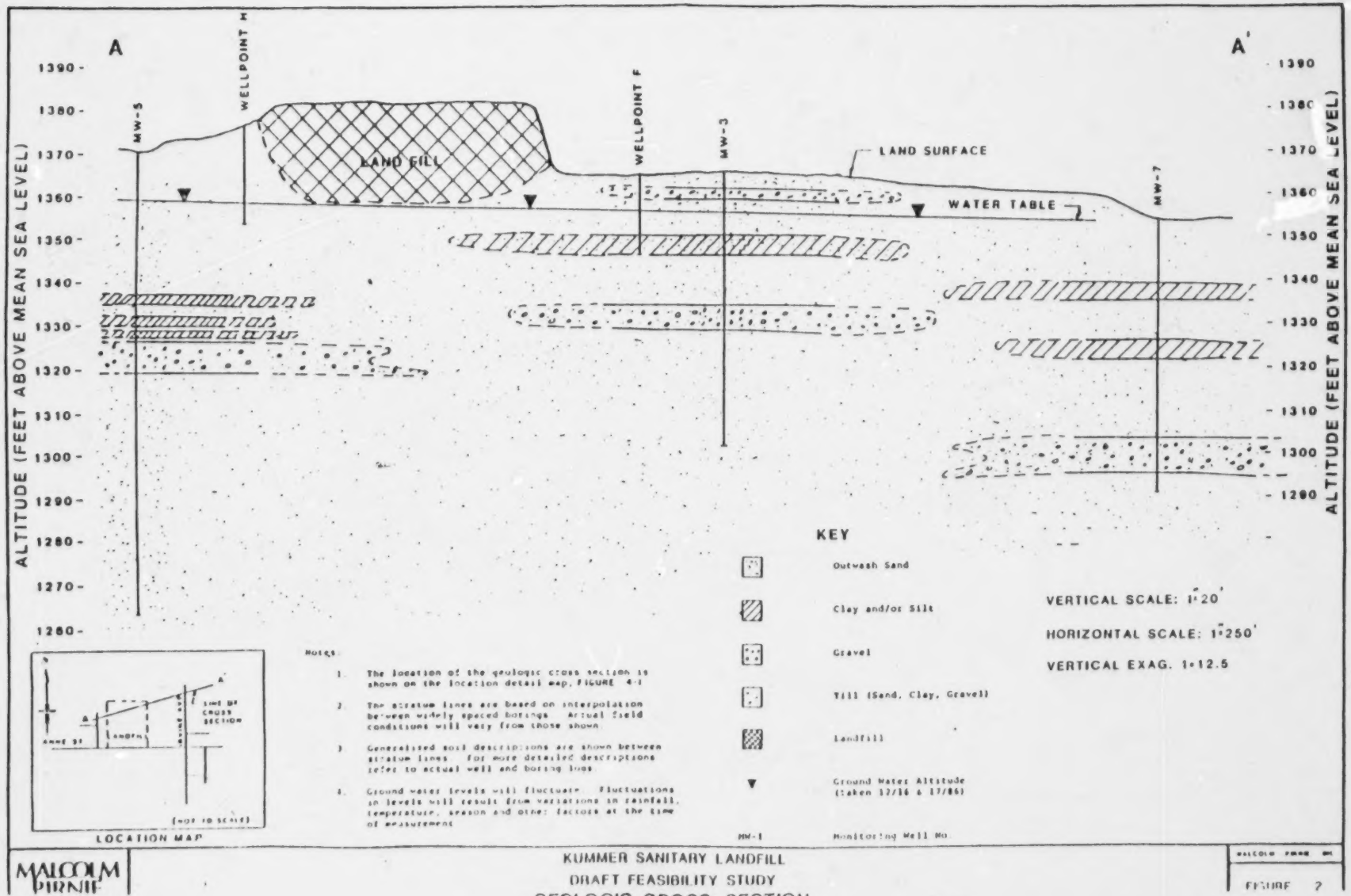
Ground water use in the Bemidji area is limited to the unconsolidated deposits above bedrock. The City of Bemidji's primary water supply wells are located one and one-quarter miles west of the site and are pumped from a depth of about 160 feet.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Kummer Sanitary Landfill was opened in 1971 with a permit (no. SW-31) from the Minnesota Pollution Control Agency (MPCA) (Attachment 1). Until 1983, the landfill accepted material described only as mixed municipal waste. The waste was deposited in the landfill using a trench and fill technique. Based upon historical information, it is highly probable that the trenches were excavated down to the water table and the refuse placed in direct contact with the water table. Early trenches were located along the southern, western, and northern borders of the property. Cover material was excavated from borrow areas within the landfill property. These borrow areas later became active landfill disposal sites. The landfill area occupied a major portion of the property by 1984. A demolition debris disposal area near the eastern edge of the site was opened in 1974 and contains fly ash and saw dust. The landfill operator was cited several times by regulatory agencies for violations and noncompliance with permit requirements.

Ground water samples were collected from the landfill monitoring wells by MPCA staff in 1982 and 1983. Nineteen volatile organic compounds (VOCs), including trichlorofluoromethane, 1,1,2,2-tetrachloroethylene, benzene, 1,2-dichloroethane and 1,1,2-trichloroethylene, were found to be present in the downgradient wells. Numerous VOCs were also found in shallow residential wells downgradient of the landfill during sampling by MPCA in 1984.

Although no documentation exists of hazardous waste disposal within the landfill, there is a likelihood that small quantities of hazardous waste, such as paint thinners, solvents, pesticides, etc., were included in the municipal wastes.



MALCOLM PIRNIE

KUMMER SANITARY LANDFILL
DRAFT FEASIBILITY STUDY
GEOLOGIC CROSS-SECTION

FIGURE 7

Repeated efforts by regulatory agencies to require the landfill operator to comply with Minnesota rules and regulations and to close the landfill finally culminated in a temporary restraining order on April 4, 1985. The MPCA then issued an Administrative Order on June 25, 1985, closing the landfill, revoking permit SW-31, and requiring the operator to begin ground water monitoring at the site.

The U.S. Environmental Protection Agency (U.S. EPA) issued a notice letter to the operator on May 29, 1985.

Section 122(a) of Superfund Amendments and Reauthorization Act of 1986 (SARA) gives the President the authority to enter into agreements with potentially responsible parties to perform response actions if he determines the actions will be done properly. If the President determines that it is inappropriate to enter into an agreement or to initiate negotiations, the responsible parties shall be notified of this decision and the reasons behind it. Charles and Ruth Kummer, the owners and operators of the landfil have been sent a letter dated September 28, 1988, notifying them of the decision not to enter into negotiation with them, consistent with this requirement of section 122(a).

On September 29, 1984, the U.S. EPA and MPCA executed a Cooperative Agreement for implementing a Remedial Investigation and Feasibility Study (RI/FS) for the Kummer Sanitary Landfill. In October 1984, the site was proposed for the National Priorities List.

On June 12, 1985, a Record of Decision (ROD) was signed which selected an alternative water supply as the remedial action for Operable Unit One. The selected remedy provides for an extension of the existing public water supply from the City of Bemidji to serve the area east of the landfill to Lake Bemidji. Construction of the water system began in June 1987, and is expected to be completed by September 1989. Approximately 244 connections to individual homes and businesses will be completed under this operable unit.

III. Community Relations History

The Superfund activities at the Kummer Sanitary Landfill site have been followed closely by the local community and press. To date, there have been public meetings, fact sheets, and press releases regarding the activities at the site. There is an active mailing list of local citizens interested in the activities at the site. A chronology of past community relations activities at the site is listed in Table 1.

A public repository has been established at the Bemidji Public Library. The administrative record for the site has been placed in the repository thereby meeting the requirements under Section 113(k) of SARA, 42 U.S.C. § 9613(k). When the RI/FS for this Source Control Operable Unit was completed, a proposed plan was prepared stating MPCA's and U.S. EPA's recommendation for remedial action at the site. A 21-day public comment period on the proposed plan was held between September 3 and September 24, 1988, consistent with Section 117(a) of SARA, 42 U.S.C. § 9617(a).

TABLE 1

COMMUNITY RELATIONS SUMMARY - KUMMER LANDFILL

March 1985	- Community relations interviews conducted and information repository established at Bemidji Public Library.
Spring 1985	- Community relations plan written and approved by U.S. EPA.
July 22, 1985	- News release to Bemidji media announcing federal Superfund study of contamination at Kummer Sanitary Landfill and money awarded for water system.
November 12, 1985	- Public meeting held to discuss future federal Superfund Remedial Investigation/Feasibility Study (RI/FS) and water distribution system.
July 10, 1986	- News release announcing meeting in Northern Township regarding beginning of RI/FS.
July 22, 1986	- Meeting held in Northern Township on RI/FS start; fact sheet provided to residents and township; RI/FS work plan placed in information repository.
January 1988	- Update fact sheet to Northern Township residents on status of water system and status of RI investigations. Fact sheet indicated that MPCA's contractor was proceeding with an FS while doing additional RI work.
August 30, 1988	- News release announcing completion of FS for cover; announcing public comment period and date of public meeting.
September 2, 1988	- Ad published in Bemidji Pioneer announcing same information as news release. FS report and proposed plan placed in information repository.
September 15, 1988	- Public meeting held, fact sheet provided to public.
September 24, 1988	- Public comment period ended; responsiveness summary written and attached to Record of Decision.

**** NOTE: Numerous news releases and letters were mailed to Northern Township residents to provide information on water system installation in 1987 and 1988 as part of the water supply operable unit.

Before the comment period commenced, a news release was issued and a newspaper advertisement placed in the local newspaper notifying the community of the availability of the proposed plan and RI/FS Reports.

A public meeting was held on September 15, 1988, where the MPCA presented the alternatives to a group of local citizens. The responsiveness summary (Attachment 2) addresses specific comments raised at the September 15 public meeting and during the comment period.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION WITHIN SITE STRATEGY

The remediation at the Kummer site has been divided into three operable units. The operable units are:

A. One: Alternative water supply

B. Two: Source control of contaminants emanating from the landfill

C. Three: Management of migration through the ground water

Operable Unit One, which is currently underway, provides for an extension of the City of Bemidji municipal water supply system into the affected area. The municipal water supply connections will provide a safe drinking water supply for residents with contaminated wells.

Operable Unit Two, now under consideration at the Kummer site, is required to control the infiltration of contaminants into area ground water, and to prevent direct human contact with landfilled wastes. Ground water remedial action will be addressed in Operable Unit Three.

The alternatives considered for source control are presented in section VII and were analyzed using U.S. EPA's nine criteria for effective Superfund action listed later in this document. The FS report presents a complete description and evaluation of the alternatives. Among these is the alternative selected for closure of the Kummer Sanitary Landfill.

V. SUMMARY OF SITE CHARACTERISTICS

Contamination in the vicinity of the site is predominantly with VOCs. The ground water is the principal medium known to have been contaminated. The source of contaminant release is most likely the waste materials that have been disposed of within the landfill. The contamination could be the result of either surface water infiltrating through the permeable landfill cover and coming in contact with the waste materials, or the waste materials being in direct contact with ground water. The exact nature and state of materials within the landfill is not known at this time because it was determined that conducting borings through the landfill would be too dangerous to the site workers.

Based upon historic data and results from the RI, ground water contamination is of primary concern at this site. Wells upgradient of the landfill have shown no contamination, while twenty-five halogenated and nonhalogenated organic compounds were detected in downgradient monitoring wells and private wells. The range of concentrations of these organic compounds in monitoring and residential wells prior to 1986 is shown in Table 2. Concentrations for these organic compounds in the downgradient wells ranged from barely detectable to upwards of 130 ug/L (micrograms per liter) for the compound tetrahydrofuran. The highest concentration for an organic compound in a residential well was 46 ug/L (methylene chloride). Otherwise, most of the organic compounds were found at concentrations below 10 ug/L. The data obtained prior to 1986 indicate an area of ground water contamination southeast of the landfill as indicated in Figure 3.

VI. SUMMARY OF SITE RISKS

The RI identified a number of indicator parameters for the subject site. The indicator selection is designed to identify the "highest risk" contaminants at the site so that the public health evaluation and subsequent remediation is focused on the chemicals of greatest concern. The indicator contaminants are chosen based upon their toxicity, mobility and quantity and are listed below:

Halogenated chemicals
- Tetrachloroethylene (PCE)
- Trichloroethylene (TCE)
- Trans-1,2-dichloroethylene
- Vinyl chloride

Non-halogenated chemicals
- Benzene

PCE and TCE are suspected carcinogens which, in terms of relevant potency, rank in the lowest quartile among 55 suspected or known carcinogens evaluated by the USEPA Carcinogens Assessment Group. Vinyl chloride and benzene are known carcinogens, while trans-1,2-dichloroethylene has not been identified as a carcinogenic compound.

Degradative transformation of PCE through TCE and through one or more dichloroethylene intermediaries such as trans-1,2-dichloroethylene and 1,1-dichloroethylene, to vinyl chloride has been suggested and may occur through biological processes.

In soils, and especially in soils of low organic content, the chlorinated ethylenes will leak into the ground water. PCE and TCE adsorb to soils with high levels of organic content. The most important fate and transport process for the chlorinated ethylenes in the upper layer of soil and surface water is volatilization into the atmosphere.

Sorption, leaching and biodegration are environmental fate processes for benzene introduced to soils. Benzene will sorb to sedimentary organic material and sorption processes are likely removal mechanisms in both ground water and surface waters. Benzene has a relatively high water solubility

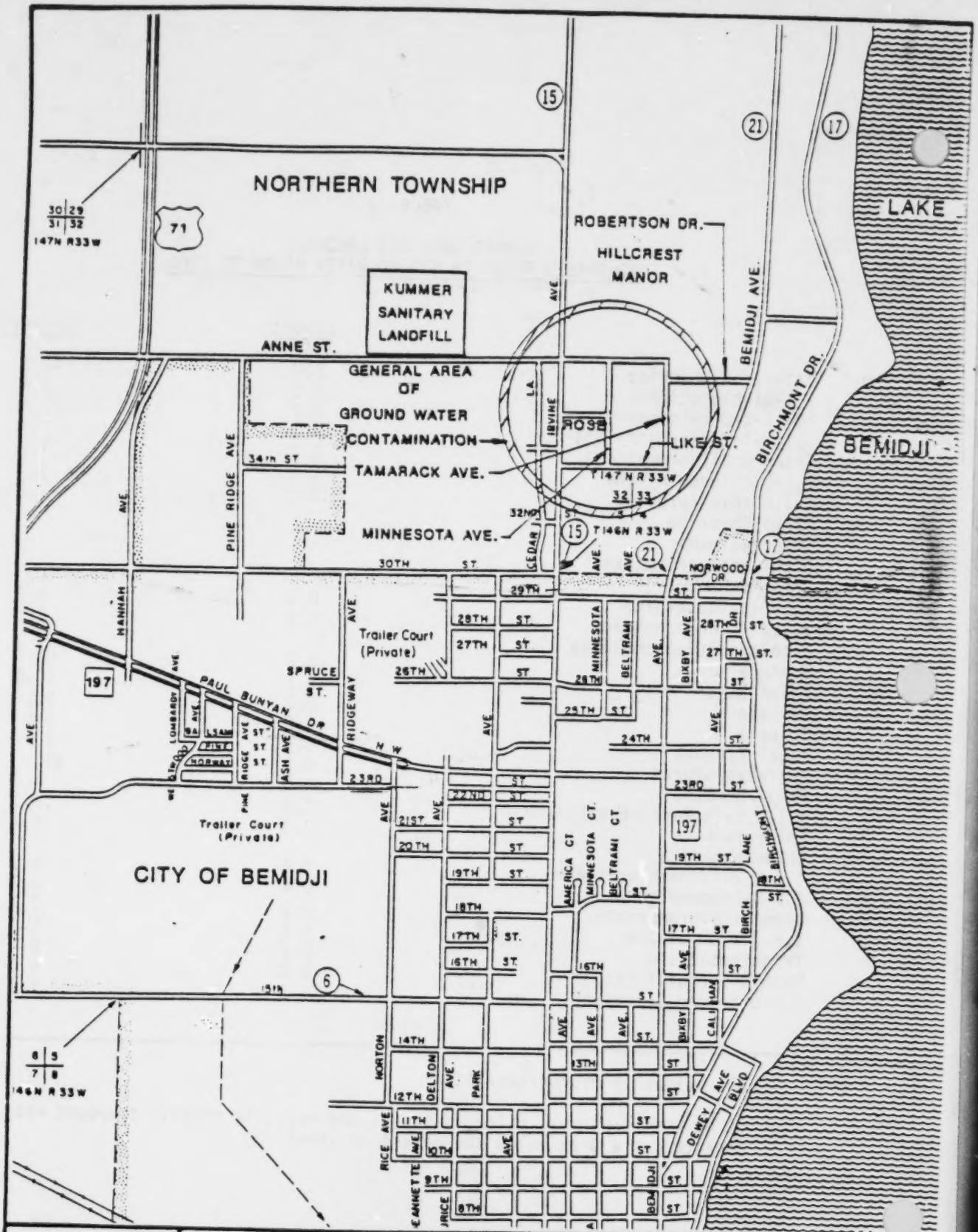
TABLE 2

KUMMER SANITARY LANDFILL
VOLATILES FOUND IN GROUND WATER PRIOR TO 1986

	Lowest	Highest
Methylene Chloride	1.0	46.0
1,1-Dichloroethane	0.3	5.4
cis 1-2-Dichloroethylene	0.2	27.0
1,1,2-Trichloroethylene	0.2	2.7
Trichlorofluoromethane	0.2	5.6
1,1-Dichloroethylene	0.2	1.7
1-2,Dichloropropane	0.2	1.7
Vinyl Chloride		
Chloromethane		
Dichlorofluoromethane		
Bromomethane		
1,2-Dichloroethane	0.1	4.2
1,1,1-Trichloroethane	0.2	8.8
Dichlorodifluoromethane		
Acetone	16.0	100.0
Ethyl Ether	0.1	60.0
Benzene	0.3	3.1
Toluene	0.5	6.8
Total Xylenes	0.6	8.2
Tetrahydrofuran	0.5	130.0
Ethyl Benzene	0.5	8.0
1,1,2,2-Tetrachloroethylene	2.0	16.0
Chloroform	0.2	2.4
Chloroethane		
1,1,2,2-Tetrachlorethane	2.0	4.6
1,2-Dibromomethane	0.4	0.7
Bromodichloromethane	0.2	0.7
1,2-Dibromoethane	0.4	0.7
Trichloroethene	0.2	2.8
Methyl Isobutyl Ketone	5.0	6.0
1,1-Dichloro-1-Propane	0.2	1.8

All values in micrograms/liter.

If no Lowest-Highest value is given, the volatile organic compound was detected as a peak below the detection level.



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KUMMER SANITARY LANDFILL
GENERAL AREA OF GROUND WATER CONTAMINATION
BASED ON PRE-1984 DATA

MALCOLM PIRNIE, INC

FIGURE 3

and a low soil-water distribution coefficient; therefore, benzene is expected to leach from soils of low organic content. Benzene may be utilized as a source of carbon by some bacteria for short periods of time. Gradual biodegradation by a variety of micro-organisms probably occurs, the rate of which may be enhanced by the presence of other hydrocarbons. Volatilization is the primary transport process for benzene introduced to aquatic systems. Environmental conditions, such as water turbulence, affect the rate of volatilization. Bioaccumulation in aquatic organisms is low at observed environmental concentrations. Once introduced to the atmosphere, however, benzene may be rapidly photo-oxidized.

The principal pathway of migration of the contaminants of concern and subsequent human exposure is through the ground water. Use of ground water for drinking or cooking results in ingestion exposure. The release of VOCs from bath or shower water can result in inhalation exposure. Skin adsorption during bathing and routine washing activities does not appear to be a significant exposure pathway at this site due to the high volatility of the contaminants and their low adsorption potential. The possibility exists for exposure by inhalation of methane or VOCs in the atmosphere, or ingestion of contaminated soils.

Table 3 compares the highest contaminant concentration found in the ground water with various, applicable criteria. These criteria include U.S. EPA Maximum Contaminant Levels (MCLs), MCL Goals (MCLGs), Proposed MCLs, and Proposed MCLGs. The State of Minnesota has also established recommended maximum contaminant concentrations (Recommended Allowable Limits) for human consumption. The concentrations of tetrachloroethylene, trichloroethylene, vinyl chloride, and benzene exceed one or more of the applicable criteria.

Testing of residential wells downgradient of the landfill revealed the presence of 18 different VOCs in the ground water. The testing showed that many of the wells contain several (up to 14) different VOCs. Several of the compounds exceeded the established 10^{-6} health risk limits while a number of compounds do not have established limits. In many cases, the residential wells contained numerous compounds which do not have established health risk limits or are below such limits and the actual health risk to the water user cannot be determined. However, an endangerment assessment identified a 3.3×10^{-4} excess cancer risk (approximately three excess cancers per 10,000) in the affected area.

A public water system is currently under construction to replace contaminated private wells in the area. However, several residents have refused to allow connections to the system and, therefore, remain at risk.

The Kummer Sanitary Landfill continues to release contamination into the ground water by allowing precipitation to percolate through the refuse resulting in the uncontrolled production of leachate.

TABLE 3

KUMMER SANITARY LANDFILL
Comparison of Contaminant Concentrations in
Ground Water to Applicable Criteria
(X denotes exceedance; all units in ug/l)

Contaminant	Well Type	Maximum Contaminant Concentration	MCLs	Other Criteria				
				MCLGs	PMCLs	PMCLGs	RALs	AWQC
Tetrachloroethylene			NA	NA	NA	0	6.9	0(0.88)
	Private	7.5				X	X	X
	Monitoring	10				X	X	X
Trichloroethylene			5	0	5	0	31.2	0(2.8)
	Private	6.8	X	X	X	X		X
	Monitoring	4.0		X		X		X
trans-1,2-Dichloroethylene			NA	NA	NA	70	70	NA
	Private	35						
	Monitoring	7.6						
Vinyl chloride			2	0	1	0	0.15	0(2.0)
	Private	41	X	X	X	X	X	X
	Monitoring	67	X	X	X	X	X	X
Benzene			5	0	5	0	12	0(0.67)
	Private	LT 1.3		X		X		X
	Monitoring	5.0		X		X		X

Notes:

MCLs and MCLGs - USEPA Maximum Contaminant Levels and Maximum Contaminant Level Goals.
PMCLs and PMCLGs - USEPA Proposed Maximum Contaminant Levels and Proposed Maximum Contaminant Level Goals.
RALs - Minnesota Department of Health Recommended Allowable Limits.
AWQC - USEPA Ambient Water Quality Criteria for the protection of human health. Adjusted for drinking water only as per USEPA (1986). Concentrations in parentheses correspond to the midpoint (10^{-6}) of the risk range for potential carciongens.
NA - Not available.
LT - Less than.

VII. DESCRIPTION OF ALTERNATIVES

The alternatives presented in the proposed plan were developed based upon a screening of possible remedial technologies, and compliance of the alternatives with applicable or relevant and appropriate requirements (ARARs) of environmental statutes. Considerations at the Kummer site which entered into the screening process are as follows:

A. The ground water is utilized by private well owners as a drinking water source. The residents have been or soon will be provided with an alternative water supply. However, some of the property owners have not permitted connections of their property to the water system.

B. An estimated 1.3 million cubic yards of waste are present at the landfill, some of which may be in direct contact with the water table.

C. Soil surrounding the landfill does not appear to be contaminated and the area of potential soil contamination is primarily within the confines of the landfill. The possibility exists that volatile contaminants are present in gas emissions emanating from the landfill.

D. Characterization data for landfill contents is unavailable.

Excavation of the landfill, with destruction of the wastes by incineration, or disposal off-site in a secure commercial landfill, or re-disposal on-site in a lined landfill, was eliminated in the screening process due to excessive cost and short-term impacts on human health from air emissions. Because there is no documentation of hazardous waste disposal at the site, the entire contents of the landfill, approximately 1.3 million cubic yards, would require excavation and removal. In addition, the excavation, removal, and transportation of the waste would cause significant impacts to the air quality and to the health and safety of the site workers.

In-place closure of the landfilled waste consisting of alternative cover systems was developed for detailed evaluation. The source control alternatives for Operable Unit Two are:

A. Alternative 1: No Action

B. Alternative 2: Proposed State Rules for Interim Municipal Landfill Closure

C. Alternative 3: Proposed State Rules for Municipal Landfill Closure

D. Alternative 4: Hazardous Waste Facility Closure

All alternatives except "no action" would include capping the 35-acre former disposal area with varying layers and thicknesses of soil and/or synthetic materials which in combination would comprise a cover system for the landfill. Each alternative cover system described below includes a foundation layer overlying existing materials to support the cover system and a continuous coarse grained soil layer in conjunction with gas vents to control gas migration. The differences in the alternative cover systems consist of varying thicknesses of cover soil, the presence and thickness of

a lateral drainage layer and the type of barrier layer utilized to minimize percolation of surface water. The cover systems would provide varying degrees of control of contaminant migration into ground water and surface water by minimizing percolation of rainfall and snow melt through the landfill contents.

Alternatives 2, 3 and 4 each contain two variations, identified as A or B. Within each alternative, the variations provide for alternative barrier layer materials which comply with Minnesota rules for landfill closure or Resource Conservation and Recovery Act (RCRA) guidance. The alternative materials are low permeability compacted clay or 30 mil high density polyethylene (HDPE) synthetic membrane.

For each alternative, except "no action," an institutional control consisting of a deed restriction will be necessary to preserve the integrity of the selected cover by preventing construction, excavation, or other activities which would damage the cover material.

The following section describes the four (4) alternatives, including material variations, which were developed for detailed evaluation. Each alternative is shown in Figure 4.

Alternative 1:

NO ACTION

Construction Cost: $32,000 - $44,000
Annual Operation and Maintenance (O&M) Costs: None
Months to Implement: 1

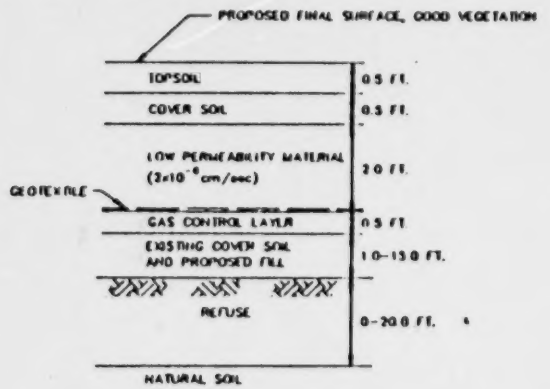
The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended requires that the "no action" alternative be considered at every site. Under this alternative, the site would be fenced to prevent direct human contact with landfilled wastes, but no further action would be taken to control the ability of contaminants to migrate to the ground water.

Alternative 2A:

PROPOSED STATE RULES FOR INTERIM MUNICIPAL LANDFILL - CLAY BARRIER

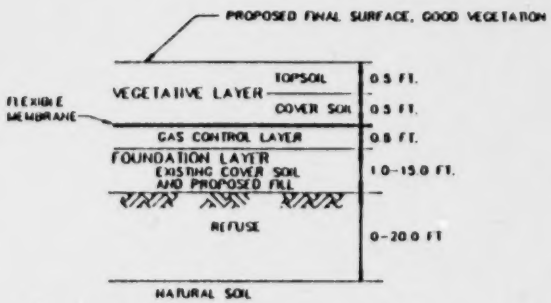
Construction Cost: $6,000,000 - $10,000,000
Annual O&M costs: $31,000
Months to Implement: 18 to 24

This remedy would include the installation of a minimum 42-inch cover system over the landfill area. The barrier to downward percolation of infiltrating surface water is provided by a 24-inch compacted clay layer. Additional quantities of soil fill are required to construct a minimum two percent slope to facilitate surface water runoff. The Alternative 2A soil cap complies with state regulations for a landfill which will no longer receive waste and will be closed within 18 months of the effective date of parts 7035.2525 to 7035.2815 of the Minnesota proposed rules.



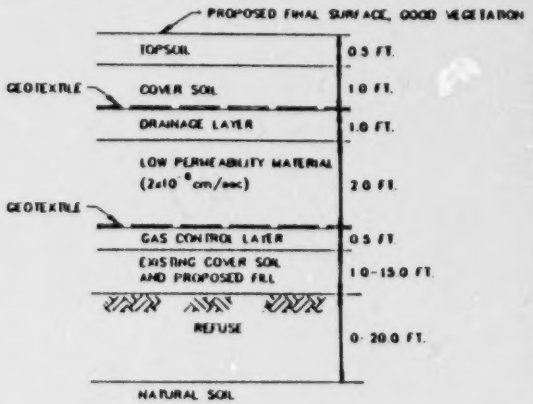
NOTE: THIS CROSS SECTION IS PER PROPOSED STATE SOLID WASTE RULES, MINNESOTA RULES PART 7035.2815, SUBPART 6, ITEM C.

ALTERNATIVE COVER SYSTEM 2A



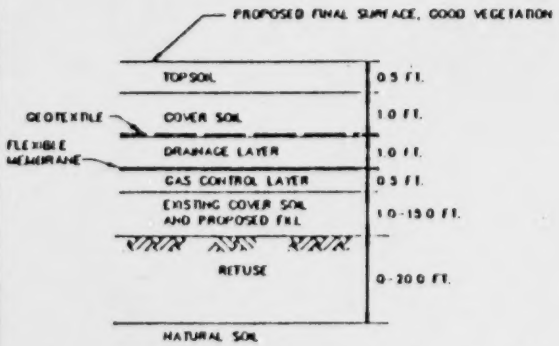
NOTE: THIS CROSS SECTION IS PER PROPOSED STATE SOLID WASTE RULES, MINNESOTA RULES PART 7035.2815, SUBPART 6, ITEM C

ALTERNATIVE COVER SYSTEM 2B



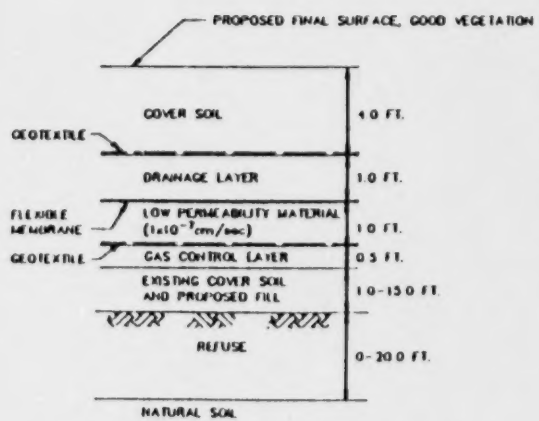
NOTE: THIS CROSS SECTION IS PER PROPOSED STATE SOLID WASTE RULES, MINNESOTA RULES PART 7035.2815, SUBPART 6, ITEM D.

ALTERNATIVE COVER SYSTEM 3A



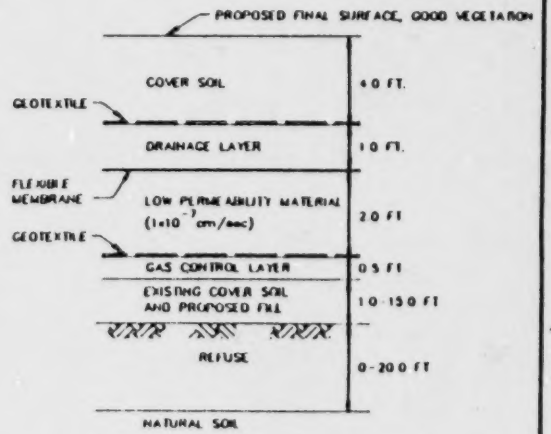
NOTE: THIS CROSS SECTION IS PER PROPOSED STATE SOLID WASTE RULES, MINNESOTA RULES PART 7035.2815, SUBPART 6, ITEM D.

ALTERNATIVE COVER SYSTEM 3B



NOTE: THIS CROSS SECTION IS PER 40 GENERAL U.S.E.P.A. GUIDANCE

ALTERNATIVE COVER SYSTEM 4A



NOTE: THIS CROSS SECTION IS PER 40 GENERAL U.S.E.P.A. GUIDANCE

ALTERNATIVE COVER SYSTEM 4B

MALCOLM PIRNIE

KUMMER PROPOSED PLAN

MINNESOTA POLLUTION CONTROL AGENCY

ALTERNATIVE COVER SYSTEMS

MALCOLM PIRNIE, INC

FIGURE 4
AUGUST 1988

Alternative 2B:

PROPOSED STATE RULES FOR INTERIM MUNICIPAL LANDFILL - SYNTHETIC MEMBRANE BARRIER

Construction Cost: $5,400,000 - $8,700,000
Annual O&M Costs: $30,000
Months to Implement: 18 to 24

This alternative is similar to Alternative 2A, except a HDPE membrane is substituted for the 24-inch clay barrier. The 30 mil thick HDPE membrane complies with state regulation for closure of a municipal landfill.

Alternative 3A:

PROPOSED STATE RULES FOR MUNICIPAL LANDFILL - CLAY BARRIER

Construction Cost: $7,400,000 - $12,500,000
Annual O&M Costs: $35,000
Months to Implement: 18 to 24

Under this alternative, the landfill area is capped by a minimum 60-inch cover system. A 24-inch compacted clay layer provides the barrier to downward migration of contaminants due to percolation of surface precipitation. In comparison to Alternative 2, Alternative 3A provides six inches of additional cover material for promotion of vegetation, drainage and protection of the barrier layer. The minimum slope is maintained at two percent and a lateral drainage layer is added to intercept surface water percolating into the cover system. This alternative complies with state regulations for a landfill which will receive wastes 18 months after the effective date of parts 7035.2525 to 7035.2815 of the Minnesota proposed rules.

Alternative 3B

PROPOSED STATE RULES FOR MUNICIPAL LANDFILL - SYNTHETIC MEMBRANE BARRIER

Construction Cost: $6,900,000 - $11,200,000
Annual O&M Costs: $33,000
Months to Implement: 18-24

This alternative is similar to Alternative 3A, except an HDPE synthetic membrane is substituted for the 24-inch clay barrier layer. The 30 mil thick HDPE liner system also complies with state regulations for closure of a municipal landfill.

Alternative 4A

RCRA EQUIVALENT FOR HAZARDOUS WASTE FACILITY

Construction Cost: $10,300,000 - $17,300,000
Annual O&M Costs: $38,000
Months to Implement: 18-24

A minimum 78-inch soil cap is included with this alternative. A composite barrier to downward percolation is provided by an HDPE liner overlying a 12-inch clay layer. The cover soil layers are 30 inches thicker than in Alternative 3. This alternative is designed to be in substantive compliance with RCRA regulations for closure of a hazardous waste facility, but varies from federal design guidance in the thickness of the clay layer.

Alternative 4B

RCRA CLOSURE FOR HAZARDOUS WASTE FACILITY

Construction Cost: $10,800,000 - $18,200,000
Annual O&M Costs: $39,000
Months to Implement: 18 to 24

Alternative 4B differs from alternative 4A in that the thickness of the clay layer is increased from 12 inches to 24 inches. This alternative is designed to comply with RCRA hazardous waste regulations and federal design guidances.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A. Overall Protection of Human Health and the Environment. All of the alternatives, with the exception of the no action alternative, would provide, with varying degrees of efficiency, an increased protection of human health and the environment with respect to existing conditions. The increased protection is achieved by reducing percolation of surface precipitation through the landfilled wastes, and thereby controlling leachate production and contaminant migration into ground water and surface water. Table 4 describes the volume and percentage of percolation reduction from the various alternatives. None of the alternative cover systems will prevent the migration of contaminants caused by wastes in contact with ground water as may be the case at the Kummer site. The cover systems would also reduce the risk of direct contact with the contaminants remaining at the site.

Alternative 4 provides the best overall protection. However, the provision of an alternative water supply (Operable Unit One) and the proposed future migration management remedial action (Operable Unit Three) reduce the risks associated with this site. Therefore, since Alternative 3 reduces 90 percent of infiltration, and considering the functions of Operable Units One and Three, Alternative 3 is as equally protective as Alternative 4.

B. Compliance with ARARs. SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements of other environmental laws. These laws may include: the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Solid Waste Disposal Act (RCRA), and any state law which has stricter requirements than the corresponding federal law.

TABLE 4
KUMMER SANITARY LANDFILL

ALTERNATIVE COVER SYSTEM HELP MODEL RESULTS

Alternative Number	Percolation from Base of Landfill (gallons/year)	Percolation from Base of Landfill (percent)*	Initial** Efficiency	Increased Efficiency (percent)***
1.	10,600,000	44.0	56.0	0.0
2A.	2,900,000	11.7	88.3	73.0
2B.	2,900,000	11.9	88.1	73.0
3A.	1,500,000	6.0	94.0	86.0
3B.	1,500,000	6.0	94.0	86.0
4A.	0	0.0	100.0	100.0
4B.	0	0.0	100.0	100.0

* Percentage of total precipitation occurring on the landfill that is percolating from the base of the landfill based on a five year annual average.

** Initial efficiency is defined as the percentage of total precipitation which is rejected or contained by the cover system under assumed initial conditions.

*** Increased Efficiency is defined by the volume reduction of percolation from the base of the landfill caused by the alternate cover system divided by the total volume of percolation without a barrier (existing conditions) rounded to the nearest percent.

Note:
1. A leakage of 50 square feet per acre was used in the analysis of those barriers utilizing a synthetic membrane.
2. The initial efficiency and the increased efficiency of all the alternative cover systems will decrease over the 50 year postclosure period.
3. Alternatives 4A and 4B will not achieve the zero percent percolation or 100 percent initial or increased efficiency indicated by the HELP Model because of material defects, poor installation and physical abrasion and degradation.

Applicable requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a site. A requirement is "applicable" if the remedial action or circumstances at the site satisfy all of the jurisdictional prerequisites of the requirement.

Relevant and appropriate requirements are cleanup standards, standards of control, and other environmental protection requirements, criteria or limitations promulgated under federal or state law that, while not legally "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to that site.

"A requirement that is judged to be relevant and appropriate must be complied with to the same degree as if it were applicable. However, there is more discretion in this determination: it is possible for only part of a requirement to be considered relevant and appropriate, the rest being dismissed if judged not to be relevant and appropriate in a given case" (Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements, 52 FR 32496, August 27, 1987).

The regulations for closure of a hazardous waste facility promulgated pursuant to RCRA, 42 U.S.C. Sections 6901, et. seq., are not "applicable" to this site because the Kummer Sanitary Landfill was not operated or permitted as a hazardous waste facility. Further, these regulations contained in Subtitle C are not "relevant and appropriate" because there is no documentation of any hazardous waste disposal at this site. The Kummer Sanitary Landfill was operated and permitted by the State of Minnesota as a mixed municipal solid waste landfill.

However, the requirements of Subtitle D of RCRA, which applies to solid waste facilities, are "applicable" at this site. The solid waste program implementation is a state and local function. The federal function is to establish the regulatory direction, set minimum standards and provide technical assistance to states in developing their own solid waste management programs. The State of Minnesota does have solid waste disposal regulations (Chapter 7035.0001 et. seq.) which are "applicable" to this site. These regulations became effective in 1970 and were revised in 1973. They were in effect at the time the landfill ceased operation in 1984. Also, the permit issued by the State of Minnesota (permit SW-31; Attachment 1) for operating the landfill required compliance with state regulations at the time of landfill closure.

The State of Minnesota is currently in the process of adopting new regulations for solid waste disposal facilities. These regulations are expected to be promulgated before the end of 1988, will be in effect, and therefore also "applicable," at the time the remedial action takes place at the Kummer Sanitary Landfill. These proposed regulations will

have "interim" requirements for landfills closed within 18 months of the effective date, and other additional requirements for landfills closed after 18 months of the effective date for the new regulations. It is anticipated the "interim" requirements will be applicable for the remedial action at this site.

Alternative 3 meets the state and federal ARARs for solid waste landfill closure. Alternative 2 meets only the "interim" state ARARs for solid waste landfills. Alternative 4 exceeds minimum state and federal ARARs for solid waste landfills. Alternative 1 does not meet minimum state or federal ARARs.

C. Long-Term Effectiveness and Permanence. Long-term effectiveness for this operable unit is evaluated in terms of the reduction of leachate generation with respect to present conditions and potential for failure of the cover system. A ground water monitoring system will be included in the Operable Unit Three work phase for management of contamination migration through ground water. The future ground water monitoring system will be used to verify the effectiveness of the containment unit.

Leachate generation was estimated using a computer model developed by the U.S. Army Corps of Engineers and average weather data for nearby St. Cloud, Minnesota. The simulated percolation reaching the base of the landfill, expressed as a percentage of total precipitation falling on the landfill surface, is as follows:

Alternative	Percentage
1	44.0
2A	11.7
2B	11.9
3A	5.9
3B	5.9
4A	0.0
4B	0.0

The above values are estimates only and represent conditions assumed to exist immediately following construction of the cover system. The simulation does not take into account the decrease in cover system effectiveness due to poor installation, material defects, and physical abrasion and degradation. Alternatives 1 and 2 do not comply with the proposed State of Minnesota requirement that a cover system be able to reject or contain at least 90 percent of the surface precipitation. Alternatives 3 and 4 do, however, exceed this requirement.

Possible failure modes for cover systems include differential settling of landfill contents and subsequent breaching of the barrier layer, penetration of the barrier layer by erosion, burrowing animals, vegetative growth, damage to the barrier layer by freezing/thawing, and improper construction and installation. Insufficient information concerning the potential for differential settlement at the landfill makes it difficult to adequately evaluate whether a clay or a synthetic membrane barrier is more appropriate for the site. Alternative 2,

which includes only 12 inches of cover soil and no lateral drainage layer, has the greatest potential for failure due to penetration or freeze/thaw damage of the barrier layer. Alternative 4 provides the greatest long-term protection against failure.

D. Reduction of Toxicity, Mobility, or Volume of the Contaminants.

None of the alternatives utilize treatment to reduce toxicity, mobility, or volume. However, alternatives 2, 3 and 4 utilize containment to reduce the volume of leachate produced and to prevent the mobility of the contaminants contained within the refuse. Containment will reduce contamination from entering the ground water, and thereby reduce the risk associated with consumption or contact with the water.

E. Short-Term Effectiveness. All cover system alternatives will have minimal potential impact on human health because construction activities will disturb only minimal volumes of in-place wastes if they are found to be present immediately adjacent to roadways. Some nuisance conditions, such as litter or odors, may occur during excavation and redisposal of some wastes. The major impact on the nearby residents will be substantially increased truck traffic required to transport the large quantities of soil comprising the cover system components. The cover system will require 18 to 24 months to design and construct, depending upon seasonal weather conditions. Alternative 4 will probably require a slightly longer construction period than Alternatives 2 and 3.

Workers may be exposed to air emissions of VOCs and methane during site grading and placement of initial layers. However, all cover alternatives share these activities. Air monitoring will be necessary and respiratory protection utilized if needed based upon the monitoring results.

F. Implementability. The equipment, materials, and skilled workers needed to construct the cover system alternatives are readily available in northern Minnesota. The plans and specifications for the alternative cover system are likely to attract construction bids from local and regional contractors. The manufacturers and suppliers of the synthetic membrane material are likely to be companies operating nationally.

G. Cost. Alternative 1 has minimal estimated construction costs. The estimated construction costs for each of the remaining alternatives are as follows:

- Alternative 2A - $ 6,000,000 - $10,000,000
- Alternative 2B - $ 5,400,000 - $ 8,700,000
- Alternative 3A - $ 7,400,000 - $12,500,000
- Alternative 3B - $ 6,900,000 - $11,200,000
- Alternative 4A - $10,300,000 - $17,300,000
- Alternative 4B - $10,800,000 - $18,200,000

The estimated construction costs are sensitive to the unit costs of the soils and/or synthetic membrane comprising the cover system

alternatives. The availability of the various soil types comprising the cover systems cannot be determined with respect to quantity, quality or unit cost until further detailed engineering investigations are initiated.

The annual operation and maintenance costs for each cover system (Alternatives 2A through 4B) are estimated as follows:

- Alternative 2A - $31,000
- Alternative 2B - $30,000
- Alternative 3A - $35,000
- Alternative 3B - $33,000
- Alternative 4A - $38,000
- Alternative 4B - $39,000

Detailed cost figures for each alternative are included in Attachment 3.

H. State Acceptance. The State of Minnesota supports the selected remedy.

I. Community Acceptance. Since only two comments were received at the public meeting and during the comment period, it is somewhat difficult to judge the community's reaction to the proposed landfill cover. Both comments were received from residents of the area and both supported alternatives other than the recommended alternative. However, the lack of comments from the county, the township and other interested parties may indicate that the recommended alternative as a satisfactory one. One remaining issue which the township questioned but did not comment upon -- channeling the surface runoff from the landfill -- will be decided during remedial design. Township concerns on this issue will be considered during the design phase.

IX. SELECTED REMEDY

The selected remedy is Alternative 3 (Figure 5). Alternative 3 has the following major components:

A. Complete site fencing and posting to restrict access to the site.

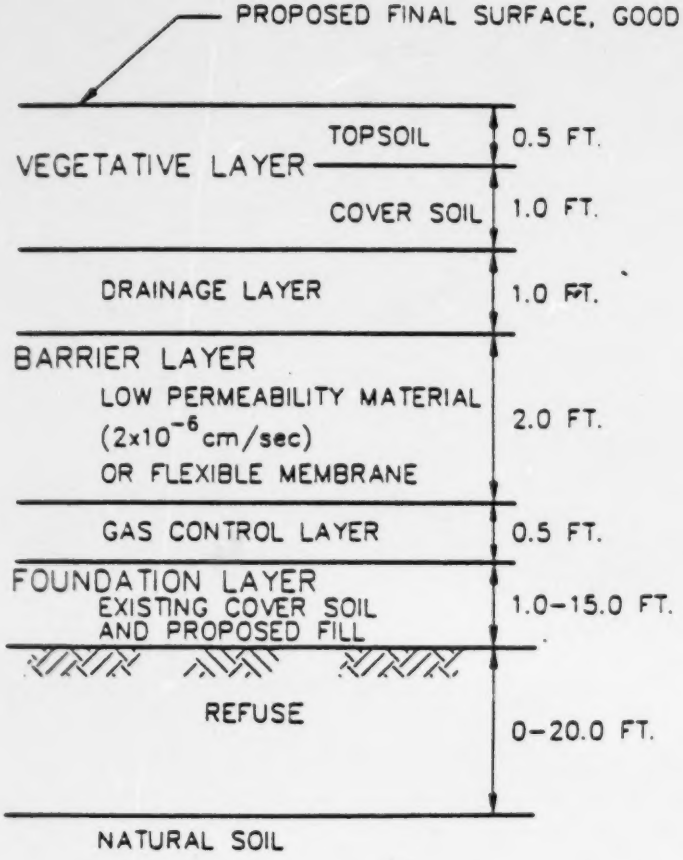
B. Site grading to promote precipitation runoff and reduce infiltration.

C. Gas control layer, lateral migration barrier, and monitoring system.

D. Site capping with a low permeability material and drainage layer which meets state and federal solid waste landfill requirements, and which minimizes leachate generation and prevents direct contact with waste materials.

E. Top cover of cover soil, top soil, and vegetation.

F. Maintenance and annual inspection of the landfill cover, and monitoring of ground water and landfill gas to determine effectiveness of above measures.



NOTE: THIS CROSS SECTION IS PER PROPOSED STATE SOLID WASTE RULES, MINNESOTA RULES PART 7035.2815, SUBPART 6, ITEM D.

MALCOLM PIRNIE

ALTERNATIVE COVER SYSTEM 3
KUMMER SOURCE CONTROL FEASIBILITY STUDY
MINNESOTA POLLUTION CONTROL AGENCY

MALCOLM PIRNIE, INC.
FIGURE 5
JULY 1988

G. Legal recording of deed restrictions designating the site as a restricted use property.

This alternative provides the best balance among the nine criteria used by the U.S. EPA to evaluate remedial action alternatives. Alternative 3 contains two (2) variations of barrier layer materials. At the present time, there is insufficient information regarding the available quantity, quality and cost of the materials comprising the barrier layer. The final selection will be made during the early design stages of the project. At that time, an evaluation will be conducted to determine the cost and availability of both barrier layer materials. One barrier layer material will be eliminated from further consideration if it is found to be cost-prohibitive. In addition, the lack of information concerning the potential settlement of the landfill also makes it impossible to evaluate whether clay or a synthetic barrier is more appropriate for the site.

Both variations of Alternative 3 use proven containment techniques and will minimize future contaminant migration by reducing the volume of precipitation which percolates through the landfilled wastes. Alternative 3 was also selected because it complies with the State of Minnesota's proposed rules for closure of a municipal landfill at a lower cost than Alternative 4.

The effectiveness of the selected cover system in protecting ground water quality will be verified by a monitoring network installed as part of the ground water operable unit phase of work.

X. STATUTORY DETERMINATIONS

A. Protection of Human Health and the Environment

The remedy selected is based upon potential future endangerment to public health, welfare and the environment. Ground water sampling indicates reasonable evidence that substantial quantities of hazardous substances and pollutants exist in the landfill waste mass. The substantial threat of continued release of these materials may present an imminent and substantial danger to public health, welfare and the environment if these substances continue to be released.

The chosen alternative is protective of human health and the environment. The fencing, deed restrictions and capping all provide protection from direct contact with contaminated materials. Capping of the landfill also reduces the emissions of methane and VOCs and reduces percolation of precipitation through the landfill and thus the migration of hazardous substances into ground water and surface water. Monitoring of the ground water and surface water under the ground water operable unit will identify any failures of the containment system. Once alerted to an elevated level of contaminants, additional remedial actions can be taken to abate any threat.

The selected alternative should not cause any unacceptable short-term risks or cross-media impacts to the environment because only minimal movement of in-place wastes will be necessary.

B. Attainment of ARARs

The selection by the State of Minnesota and the U.S. EPA of the landfill cover and related activities for the Kummer Sanitary Landfill will comply with the following applicable or relevant and appropriate state and federal solid waste landfill requirements:

1. RCRA Subtitle D, 40 CFR 257, for closure of solid waste facilities.

2. Current Minnesota Rules pt. 7035.1700 Z, for closure of solid waste landfills (Attachment 4).

3. Proposed Minnesota Rules pt. 7035.2815, subp. 6, for closure of so waste landfills (Attachment 5).

4. Minnesota solid waste permit number SW-31 issued April 26, 1971, to the owners/operators of the Kummer Sanitary Landfill (Attachment 1).

C. Cost-Effectiveness

The selected remedy is prescribed by compliance with applicable state and federal solid waste landfill closure ARARs. Alternative 3 provides greater protection against infiltration than Alternative 2 at a cost substantially less than that of Alternative 4. In addition, the use of a drainage layer and additional cover soil in Alternative 3 will provide greater protection against freeze/thaw damage, erosion, vegetative root damage, and burrowing animals than Alternative 2, thereby requiring less maintenance and repair.

The proposed plan presents an estimated range of costs for construction and annual operation and maintenance. The range of estimated costs considers whether the cover materials are readily available in the landfill vicinity. The final construction cost is expected to fall within the range of costs provided.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

SARA mandates a preference for the selection of permanent remedies that completely or probably produce a "...permanent and significant decrease in the toxicity, mobility or volume of the hazardous substance, pollutant or contaminant."

SARA also specifies that the selected remedial action must use "...permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable." If the selected remedial action is not appropriate for the permanence and treatment preferences cited above, an explanation of why a remedial action not incorporating these features was selected is required.

There is no known location of hazardous waste disposal at the Kummer Sanitary Landfill. Therefore, the entire landfill volume, approximately 1.3 million cubic yards, would require excavation and removal for the remedial technologies indicated below. These technologies were screened and eliminated from further development and analysis as being impractical for the reasons indicated.

1. Removal is cost-prohibitive for this site, and would adversely affect the air quality and pose a risk to site worker health and safety.

2. Treatment (on-site and off-site) methods such as solidification, biological, and chemical are inappropriate for mixed municipal refuse. Incineration is cost-prohibitive.

3. Off-site disposal would not achieve site air quality objectives during excavation, would increase human exposure during transportation, and would be cost-prohibitive.

4. On-site disposal is impractical because sufficient area is not available for simultaneous excavation, waste staging, and RCRA landfill construction. It is also cost-prohibitive.

The selected remedy, Alternative 3, represents the most appropriate solution for this site. Based upon the information presented, the State of Minnesota and the U.S. EPA believe the selected remedy will protect ground water quality by reducing infiltration and leachate production. It provides the best balance among all nine evaluation criteria, with the following being the most important considerations for the site:

1. Initial rejection of 94 percent of precipitation occurring on the landfill.

2. Compliance with state and federal ARARs for solid waste landfill closure.

3. Availability of equipment and materials.

4. Cost of construction, operation and maintenance.

5. Acceptance by the State of Minnesota and the community.

AGENCY MEMBERS
HOWARD A. ANDERSEN, M.D., CHAIRMAN, ROCHESTER
F. WAYNE PACKARD, VICE CHAIRMAN, MINNEAPOLIS
JOHN R. BORCHERT, GOLDEN VALLEY
MILTON J. FELLOWS, WORTHINGTON
STEVE J. GADLER, P.E., ST. PAUL
MACE V. HARRIS, CLOQUET
HOMER C. LUICK, MINNEAPOLIS
MRS. R. C. (DOROTHY) NELSON, DULUTH
ROBERT C. TUVESON, ALBERT LEA

ATTACHMENT 1

Grant J. Merritt
JOHN P. [illegible], P.E.,
EXECUTIVE DIRECTOR

POLLUTION CONTROL AGENCY
717 DELAWARE STREET S.E.
(OAK AND DELAWARE STREETS S.E.)
MINNEAPOLIS 55440
612-378-1320

PERMIT FOR CONSTRUCTION AND OPERATION OF SOLID WASTE DISPOSAL SYSTEM

Kummer Sanitary Landfill

Pursuant to authorization by the Minnesota Pollution Control Agency, and in accordance with the provisions of Minnesota Statutes, Chapters 115 and 116, as amended, and Agency regulations SW 1-11, plans are approved and a permit is hereby granted to Mr. Charles Kummer, Bemidji for construction and operation of a solid waste disposal system in Section 32, T147N, R33W, Northern Township, Beltrami County subject to the conditions given below.

The system consists of a sanitary landfill within a limited access area, operation equipment and other facilities. The site consists of approximately 40 acres. The facilities and operating procedures are further described in a permit application dated December 7, 1970, with plans, informational material and additional material received through April 9, 1971, all prepared under the direction of Mr. Peter J. Meyer, P.E. Cass Lake. Development will be in accordance with the ultimate land use plan "Ultimate Use: Agricultural" revised April 1, 1971 prepared under the direction of Mr. Peter J. Meyer.

General Conditions

1. This permit shall not release the permittee from any liability or obligation imposed by Minnesota Statutes or local ordinances and shall remain in force subject to all conditions and limitations now or hereafter imposed by law. The permit shall be permissive only and shall not be construed as estopping or limiting any claims against the permittee, its agents, contractors, or assigns, nor as estopping or limiting any legal claims of the State against the permittee, its agents, contractors, or assigns, for damage to State property, or for any violation of the terms of this permit.

2. No assignment of this permit shall be effective until it is executed in writing and signed by the parties thereto and thereafter filed with the Agency.

3. No major alterations or additions to the disposal system will be made without the written consent of the Agency.

4. The use of the disposal system shall be in accord with and limited to the operation and/or disposal of waste materials or substances described in the plans and/or permit application and associated material on file with the Agency.

5. This permit is subject without public hearing to modification or revocation, and may be suspended at any time for failure to comply with the terms stated herein or the provisions of any other applicable regulations or standards of the Agency or its predecessors, and is issued with the understanding that it does not estop subsequent establishment of further requirements for disposal or operation at any time or insertion of appropriate additional clauses herein at the discretion of the Agency if it is considered necessary in order to prevent or reduce possible pollution of the environment because of changed or unforeseen circumstances.

6. The permittee or assigns shall defend, indemnify and hold harmless the State of Minnesota, its officers, agents and employees officially or personally responsible, against any and all actions, claimes or demands whatsoever which may arise from or on account of the issuance of this permit, or the construction, maintenance or operation of any facility hereunder.

7. The permittee will notify the Agency when construction is completed, and reports describing the types and quantities of waste disposal at the site shall be submitted to the Agency every month, together with other information of the operation of the disposal system.

8. The disposal system shall be operated at all times in accordance with any applicable regulations or standards of the Minnesota Pollution control Agency now or hereafter adopted.

Floyd O. Forsberg

Floyd O. Forsberg, P.E.
Director
Division of Solid Waste

Grant J. Merritt

Grant J. Merritt
Executive Secretary and Chief
Executive Officer

Permit No. SW 31

Dated April 26, 1971

30016

ATTACHMENT 2

KUMMER LANDFILL, NORTHERN TOWNSHIP, MINNESOTA

SOURCE CONTROL FEASIBILITY STUDY

RESPONSIVENESS SUMMARY

This community responsiveness summary has been developed to document community involvement and concerns during the source control operable unit phase of the project, and to respond to public comments received during the public comment period. Table 1 in the Record of Decision is a summary of the community relations activities conducted by the Minnesota Pollution Control Agency (MPCA) since the Remedial Investigation and Feasibility Study was funded, under a cooperative agreement with the U.S. Environmental Protection Agency (EPA). EPA hereby adopts the MPCA responses for the purpose of Section 117 of CERCLA.

A. OVERVIEW

The recommended alternative for a landfill cover at the Kummer site was announced to the community through an advertisement in the local newspaper and a news release from the MPCA. These items were also mailed to persons on the Kummer site mailing list. The recommended alternative is a landfill cover which includes a 2 to 25 percent slope, a gas control layer, a barrier layer of either two feet of clay or a 30-mil high density polyethylene membrane, a drainage layer, cover soil and vegetated topsoil.

Few comments were received on the Feasibility Study. Those which were received did not totally support the MPCA's recommended alternative or the other alternatives evaluated. The agency's response to those comments is contained in a later section of the responsivness summary.

This responsiveness summary contains the following sections:

- Background on Community Involvement
- Summary of Comments Received and Agency Responses
- Remaining Issues

B. BACKGROUND ON COMMUNITY INVOLVEMENT

Since the discovery of contaminated private wells in 1984, community interest in the Kummer Landfill site has been high. To date, however, the interest has primarily centered on the well contamination and installation of the public water supply system. Township officials and residents have continued to express interest in ground water contamination and landfill closure issues, however, because of the past effects on the wells in the area east of the landfill.

The MPCA conducted the community relations activities for the Superfund project. In November 1985, residents were provided with information on plans for the project through a news release and public meeting. A second public meeting was held and fact sheet provided in July 1986, following approval of the work plan and start of the field work. An updated fact sheet containing information on the progress of the ground water investigation was mailed to persons on the Northern Township mailing list in January 1988. The fact sheet also indicated that the MPCA's consultant was going to proceed with the feasibility study while continuing work on the investigation.

The MPCA announced a 21-day public comment period (September 3 - September 24, 1988) on the alternatives for the landfill cover through an advertisement in the Bemidji newspaper and a news release. Copies of the advertisement and news release were also mailed to persons on the mailing list. A public meeting was held midway in the public comment period, on September 15, and fact sheets were distributed at the meeting and made available through the township.

C. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND MPCA RESPONSES

Comments received during the public comment period on the Source Control Feasibility Study and Proposed Plan are summarized below:

Comment: A Northern Township resident commented that the proposed alternative is not as protective as alternative 4, and that since the cost of the proposed alternative was already high, the added protection provided by alternative 4 was worth the additional few million dollars. He also suggested placing blacktop over the landfill instead, so that it could have a future use as a parking lot, skating rink, etc. Finally, he suggested that the community needs to know the actual effectiveness of the cover alternative and requested the MPCA to provide information on its use and effectiveness elsewhere.

MPCA Response: Although the proposed alternative is not as effective as alternative 4, in conjunction with the public water supply for the affected area and probable future ground water cleanup actions, it is the most appropriate and cost-effective alternative.

The MPCA had considered using asphalt for the barrier layer in the cover system. However, further evaluation of this material found that, as the landfill settles, the asphalt layer would crack and would require constant maintenance in order to insure the integrity of the barrier. Relative to long-term use of the site, future use of the property must allow for maintaining the integrity of the gas venting system. In addition, the added weight placed on the site by development such as a parking lot would cause additional cracks and result in further settling of the landfill.

The engineering technologies used in the cover system are proven technologies used elsewhere in the country. The MPCA will provide examples to the Township Board on where such technologies are used and how effective they are.

Comment: A Bemidji resident expressed concern about continued contamination from the wastes already in the landfill and suggested removal of the wastes.

MPCA Response: Originally, the MPCA evaluated excavation of the buried wastes. However, this alternative was eliminated because of possible high vapor levels and dangers to site workers and residents from excavating the site, and the very high cost of excavation and treatment or disposal -- in the range of $260 million.

D. REMAINING ISSUES

The MPCA was unable to specify which barrier layer for the cover -- clay or a high density polyethylene membrane -- would be the final choice. This decision will be made during the early stages of remedial design, after the MPCA receives more site-specific information on the availability and cost of both barrier materials. The MPCA considers either barrier layer material equivalent and appropriate for the cover as both have been designed to divert water from entering the fill material and infiltrating through the buried wastes.

At the public meeting, the Northern Township Board Chairman expressed interest in where drainage water from the landfill would be channeled. This, too, will be an issue determined during remedial design, and the MPCA will keep the Township informed on all alternatives being considered for channeling the drainage and will consider Township concerns in developing the design.

The Board Chairman also expressed interest in the potential, future ground water pumpout system, and asked where the pumpout water would go after treatment. This issue is not a part of the landfill cover feasibility study. However, the MPCA will keep the Township Board informed on the additional remedial investigation and feasibility study for the ground water as these studies progress.

ATTACHMENT 3

COST SUMMARIES

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 1

25-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$8.00	$24,000		A
ACCESS GATES	0	EA	$2,000.00	$0		A
ACCESS ROADS	0	LF	$10.00	$0		A
DIVERSION CHANNELS	0	LF	$3.00	$0		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	0	LS	$25,000.00	$0		A
CLEARING AND GRUBBING	0	ACRE	$1,000.00	$0		A,B,C
GRADE & COMPACT SUBBASE (-)	0	CY	$0.30	$0		A,C
SOIL FILL						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$4.50	$0		A
GAS CONTROL						
GAS LAYER						
SAND (-)						
EXCAVATION,HAULAGE AND COMPACTION	0	CY	$4.50	$0		A,B
PIPE VENTS	0	EA	$400.00	$0		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	0	CY	$3.00	$0		B,C
BACKFILL MATERIAL	0	CY	$13.00	$0		B,C
PIPING	0	LF	$5.00	$0		B,C
SYNTHETIC MEMBRANE	0	SF	$0.45	$0		B,C
GAS MONITORS	0	EA	$750.00	$0		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.15	$0		D,E
FLEXIBLE MEMBRANE (30 MILS)	0	SF	$0.33	$0		D,E
LOW PERMEABILITY MATERIAL (-)						
HAULAGE, PLACEMENT AND COMPACTION	0	CY	$6.00	$0		A,F
LATERAL DRAINAGE LAYER						
SAND (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$12.00	$0		B,C
LATERAL PIPE DRAINS	0	LF	$2.50	$0		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.15	$0		D,E
COVER SOIL (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$4.50	$0		A,F
REVEGETATION	0	ACRE	$1,000.00	$0		A,B,C
					$24,000	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$1,200	6
PERMITTING, LICENSING AND LEGAL (3%)			3%		$720	6
ENGINEERING (10%)			10%		$2,400	6
CONTINGENCY (15%)			15%		$3,600	6
TOTAL					$31,920	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 1

17-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$11.00	$33,000		A
ACCESS GATES	0	EA	$3,150.00	$0		A
ACCESS ROADS	0	LF	$50.00	$0		A
DIVERSION CHANNELS	0	LF	$6.50	$0		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	0	LS	$50,000.00	$0		A
CLEARING AND GRUBBING	0	ACRE	$1,500.00	$0		A,B,C
GRADE & COMPACT SUBBASE (-)	0	CY	$0.49	$0		A,C
SOIL FILL						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$7.09	$0		A
GAS CONTROL						
GAS LAYER						
SAND (-)						
EXCAVATION,HAULAGE AND COMPACTION	0	CY	$12.00	$0		A,B
PIPE VENTS	0	EA	$500.00	$0		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	0	CY	$3.00	$0		B,C
BACKFILL MATERIAL	0	CY	$13.00	$0		B,C
PIPING	0	LF	$5.00	$0		B,C
SYNTHETIC MEMBRANE	0	SF	$0.45	$0		B,C
GAS MONITORS	0	EA	$1,000.00	$0		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.20	$0		D,E
FLEXIBLE MEMBRANE (30 MILS)	0	SF	$0.45	$0		D,E
LOW PERMEABILITY MATERIAL (-)						
HAULAGE, PLACEMENT AND COMPACTION	0	CY	$12.00	$0		A,F
LATERAL DRAINAGE LAYER						
SAND (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$21.00	$0		B,C
LATERAL PIPE DRAINS	0	LF	$3.50	$0		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.20	$0		D,E
COVER SOIL (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$10.00	$0		A,F
REVEGETATION	0	ACRE	$1,500.00	$0		A,B,C
					$33,000	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$1,650	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$990	G
ENGINEERING (10%)			10%		$3,300	G
CONTINGENCY (15%)			15%		$4,950	G
TOTAL					$43,890	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 1

23-Aug-88

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
SITE MAINTENANCE						
ANNUAL INSPECTION	0	YR	$560.00	$0		B,C,H
SITE MOWING/REVEGETATION	0	ACRE	$300.00	$0		B,C,H
EROSION CONTROL/MAINTENANCE	0	ACRE	$225.00	$0		B,C,H
GENERAL REPAIRS	0	ACRE	$0.00	$0		B,C,H
METHANE MONITORING	0	LS	$5,000.00	$0		MPI
SUBTOTAL					$0	
CONTINGENCY (15%)				$0		
TOTAL					$0	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 2A

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$8.00	$24,000		A
ACCESS GATES	3	EA	$2,000.00	$6,000		A
ACCESS ROADS	1000	LF	$10.00	$10,000		A
DIVERSION CHANNELS	5700	LF	$3.00	$17,100		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$25,000.00	$25,000		A
CLEARING AND GRUBBING	36	ACRE	$1,000.00	$36,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.30	$8,700		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$4.50	$2,812,500		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	32500	CY	$4.50	$146,250		A,B
PIPE VENTS	40	EA	$400.00	$16,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$750.00	$11,250		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.15	$0		D,E
FLEXIBLE MEMBRANE (30 MILS)	0	SF	$0.33	$0		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT COMPACTION	115000	CY	$6.00	$690,000		A,F
LATERAL DRAINAGE LAYER						
SAND (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$12.00	$0		B,C
LATERAL PIPE DRAINS	0	LF	$2.50	$0		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
COVER SOIL (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$4.50	$261,000		A,F
REVEGETATION	36	ACRE	$1,000.00	$36,000		A,B,C
					$4,503,010	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$225,151	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$135,090	G
ENGINEERING (10%)			10%		$450,301	G
CONTINGENCY (15%)			15%		$675,452	S
TOTAL					$5,989,003	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 2A

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$11.00	$33,000		A
ACCESS GATES	3	EA	$3,150.00	$9,450		A
ACCESS ROADS	1000	LF	$50.00	$50,000		A
DIVERSION CHANNELS	5700	LF	$6.50	$37,050		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$50,000.00	$50,000		A
CLEARING AND GRUBBING	36	ACRE	$1,500.00	$54,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.49	$14,210		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$7.09	$4,431,250		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$12.00	$348,000		A,B
PIPE VENTS	40	EA	$500.00	$20,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$1,000.00	$15,000		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.20	$0		D,E
FLEXIBLE MEMBRANE (30 MILS)	0	SF	$0.45	$0		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT COMPACTION	115000	CY	$12.00	$1,380,000		A,F
LATERAL DRAINAGE LAYER						
SAND (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$21.00	$0		B,C
LATERAL PIPE DRAINS	0	LF	$3.50	$0		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
COVER SOIL (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$10.00	$580,000		A,F
REVEGETATION	36	ACRE	$1,500.00	$54,000		A,B,C
					$7,557,670	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$377,884	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$226,730	G
ENGINEERING (10%)			10%		$755,767	G
CONTINGENCY (15%)			15%		$1,133,651	G
TOTAL					$10,051,701	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 2A

30-Aug-88

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
SITE MAINTENANCE						
ANNUAL INSPECTION	1	YR	$560.00	$560		B,C,H
SITE MOWING/REVEGETATION	36	ACRE	$200.00	$7,200		B,C,H
EROSION CONTROL/MAINTENANCE	36	ACRE	$225.00	$8,100		B,C,H
GENERAL REPAIRS	2500	ACRE	$2.60	$6,500		B,C,H
METHANE MONITORING	1	LS	$5,000.00	$5,000		MPI
SUBTOTAL					$27,360	
CONTINGENCY (15%)				$4,104		
TOTAL					$31,464	

NOTE: THE PRESENT WORTH OF THE TOTAL OPERATION AND MAINTENANCE COSTS OVER 30 YEARS AT 10% INTEREST IS APPROXIMATELY $315,000.

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 2B

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$8.00	$24,000		A
ACCESS GATES	3	EA	$2,000.00	$6,000		A
ACCESS ROADS	1000	LF	$10.00	$10,000		A
DIVERSION CHANNELS	5700	LF	$3.00	$17,100		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$25,000.00	$25,000		A
CLEARING AND GRUBBING	36	ACRE	$1,000.00	$36,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.30	$8,700		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$4.50	$2,812,500		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$4.50	$130,500		A,B
PIPE VENTS	40	EA	$400.00	$16,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$750.00	$11,250		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.15	$0		D,E
FLEXIBLE MEMBRANE (30 MILS)	1570000	SF	$0.33	$518,100		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT COMPACTION	0	CY	$6.00	$0		A,F
LATERAL DRAINAGE LAYER						
SAND (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$12.00	$0		B,C
LATERAL PIPE DRAINS	0	LF	$2.50	$0		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.15	$0		D,E
COVER SOIL (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$4.50	$261,000		A,F
REVEGETATION	36	ACRE	$1,000.00	$36,000		A,B,C
					$4,079,860	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$203,993	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$122,396	G
ENGINEERING (10%)			10%		$407,986	G
CONTINGENCY (15%)			15%		$611,979	G
TOTAL					$5,426,214	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 2B

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$11.00	$33,000		A
ACCESS GATES	3	EA	$3,150.00	$9,450		A
ACCESS ROADS	1000	LF	$50.00	$50,000		A
DIVERSION CHANNELS	5700	LF	$6.50	$37,050		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$50,000.00	$50,000		A
CLEARING AND GRUBBING	36	ACRE	$1,500.00	$54,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.49	$14,210		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$7.09	$4,431,250		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$12.00	$348,000		A,B
PIPE VENTS	40	EA	$500.00	$20,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$1,000.00	$15,000		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.20	$0		D,E
FLEXIBLE MEMBRANE (20 MILS)	1570000	SF	$0.45	$706,500		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT COMPACTION	0	CY	$12.00	$0		A,F
LATERAL DRAINAGE LAYER						
SAND (-)						
EXCAVATION, HAULAGE AND COMPACTION	0	CY	$21.00	$0		B,C
LATERAL PIPE DRAINS	0	LF	$3.50	$0		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.20	$0		D,E
COVER SOIL (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$10.00	$580,000		A,F
REVEGETATION	36	ACRE	$1,500.00	$54,000		A,B,C
					$6,570,170	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$328,509	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$197,105	G
ENGINEERING (10%)			10%		$657,017	G
CONTINGENCY (15%)			15%		$985,525	G
TOTAL					$8,738,326	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 2B

30-Aug-88

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
SITE MAINTENANCE						
ANNUAL INSPECTION	1	YR	[illegible]	[illegible]		B,C,H
SITE MOWING/REVEGETATION	36	ACRE	[illegible]	[illegible]		B,C,H
EROSION CONTROL/MAINTENANCE	36	ACRE	$225.00	$8,100		B,C,H
GENERAL REPAIRS	2500	ACRE	$2.00	$5,000		B,C,H
METHANE MONITORING	1	LS	$5,000.00	$5,000		MPI
SUBTOTAL					$25,860	
CONTINGENCY (15%)				$3,879		
TOTAL					$29,739	

NOTE: THE PRESENT WORTH OF THE TOTAL OPERATION AND MAINTENANCE COSTS OVER 30 YEARS AT 10% INTEREST IS APPROXIMATELY $300,000.

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 3A

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$8.00	$24,000		A
ACCESS GATES	3	EA	$2,000.00	$6,000		A
ACCESS ROADS	1000	LF	$10.00	$10,000		A
DIVERSION CHANNELS	5700	LF	$3.00	$17,100		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$25,000.00	$25,000		A
CLEARING AND BRUSHING	36	ACRE	$1,000.00	$36,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.30	$8,700		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$4.50	$2,812,500		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$4.50	$130,500		A,B
PIPE VENTS	40	EA	$400.00	$16,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$750.00	$11,250		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
FLEXIBLE MEMBRANE (30 MILS)	0	SF	$0.33	$0		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT AND COMPACTION	115000	CY	$6.00	$690,000		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$12.00	$696,000		B,C
LATERAL PIPE DRAINS	10000	LF	$2.50	$25,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
COVER SOIL (18")						
EXCAVATION, HAULAGE AND COMPACTION	87000	CY	$4.50	$391,500		A,F
REVEGETATION	36	ACRE	$1,000.00	$36,000		A,B,C
					$5,574,260	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$278,713	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$167,228	G
ENGINEERING (10%)			10%		$557,426	G
CONTINGENCY (15%)			15%		$836,139	G
TOTAL					$7,413,766	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 3A

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	[illegible]					A
ACCESS GATES	[illegible]					A
ACCESS ROADS	1000	LF	[illegible]	[illegible]		A
DIVERSION CHANNELS	5700	LF	$6.50	$37,050		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$50,000.00	$50,000		A
CLEARING AND GRUBBING	36	ACRE	$1,500.00	$54,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.49	$14,210		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$7.09	$4,431,250		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$12.00	$348,000		A,B
PIPE VENTS	40	EA	$500.00	$20,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$1,000.00	$15,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
FLEXIBLE MEMBRANE (30 MILS)	0	SF	$0.45	$0		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT AND COMPACTION	115000	CY	$12.00	$1,380,000		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$21.00	$1,218,000		B,C
LATERAL PIPE DRAINS	10000	LF	$3.50	$35,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
COVER SOIL (18")						
EXCAVATION, HAULAGE AND COMPACTION	87000	CY	$10.00	$870,000		A,F
REVEGETATION	36	ACRE	$1,500.00	$54,000		A,B,C
					$9,414,670	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$470,734	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$282,440	G
ENGINEERING (10%)			10%		$941,467	G
CONTINGENCY (15%)			15%		$1,412,201	G
TOTAL					$12,521,511	

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KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 3A

30-Aug-88

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
SITE MAINTENANCE						
ANNUAL INSPECTION	1	YR	$560.00	$560		B,C,H
SITE MOWING/REVEGETATION	36	ACRE	$200.00	$7,200		B,C,H
EROSION CONTROL/MAINTENANCE	36	ACRE	$225.00	$8,100		B,C,H
GENERAL REPAIRS	2500	ACRE	$3.85	$9,625		B,C,H
METHANE MONITORING	1	LS	$5,000.00	$5,000		MPI
SUBTOTAL					$30,485	
CONTINGENCY (15%)				$4,573		
TOTAL					$35,058	

NOTE: THE PRESENT WORTH OF THE TOTAL OPERATION AND MAINTENANCE COSTS OVER 50 YEARS AT 10% INTEREST IS APPROXIMATELY $355,000.

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 3B

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$8.00	$24,000		A
ACCESS GATES	3	EA	$2,000.00	$6,000		A
ACCESS ROADS	1000	LF	$10.00	$10,000		A
DIVERSION CHANNELS	5700	LF	$3.00	$17,100		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$25,000.00	$25,000		A
CLEARING AND GRUBBING	36	ACRE	$1,000.00	$36,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.30	$8,700		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$4.50	$2,812,500		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$4.50	$130,500		A,B
PIPE VENTS	40	EA	$400.00	$16,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$750.00	$11,250		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.15	$0		D,E
FLEXIBLE MEMBRANE (30 MILS)	1570000	SF	$0.33	$518,100		D,E
LOW PERMEABILITY MATERIAL (-)						
HAULAGE, PLACEMENT AND COMPACTION	0	CY	$6.00	$0		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$12.00	$696,000		B,C
LATERAL PIPE DRAINS	10000	LF	$2.50	$25,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
COVER SOIL (18")						
EXCAVATION, HAULAGE AND COMPACTION	87000	CY	$4.50	$391,500		A,F
REVEGETATION	36	ACRE	$1,000.00	$36,000		A,B,C
					$5,166,860	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$258,343	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$155,006	G
ENGINEERING (10%)			10%		$516,686	G
CONTINGENCY (15%)			15%		$775,029	G
TOTAL					$6,871,924	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 3B

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$11.00	$33,000		A
ACCESS GATES	3	EA	$3,150.00	$9,450		A
ACCESS ROADS	1000	LF	$50.00	$50,000		A
DIVERSION CHANNELS	5700	LF	$6.50	$37,050		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$50,000.00	$50,000		A
CLEARING AND GRUBBING	36	ACRE	$1,500.00	$54,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.49	$14,210		A,C
SOIL FILL (2% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	625000	CY	$7.09	$4,431,250		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$12.00	$348,000		A,B
PIPE VENTS	40	EA	$500.00	$20,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$1,000.00	$15,000		A,C
GEOTEXTILE (FILTER FABRIC)	0	SF	$0.20	$0		D,E
FLEXIBLE MEMBRANE (30 MILS)	1570000	SF	$0.45	$706,500		D,E
LOW PERMEABILITY MATERIAL (-)						
HAULAGE, PLACEMENT AND COMPACTION	0	CY	$12.00	$0		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$21.00	$1,218,000		B,C
LATERAL PIPE DRAINS	10000	LF	$3.50	$35,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
COVER SOIL (18")						
EXCAVATION, HAULAGE AND COMPACTION	87000	CY	$10.00	$870,000		A,F
REVEGETATION	36	ACRE	$1,500.00	$54,000		A,B,C
					$8,427,170	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$421,359	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$252,815	G
ENGINEERING (10%)			10%		$842,717	G
CONTINGENCY (15%)			15%		$1,264,076	G
TOTAL					$11,208,136	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 3B

30-Aug-88

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
SITE MAINTENANCE.						
ANNUAL INSPECTION	1	YR	$560.00	$560		B.C.H
SITE MOWING/REVEGETATION	36	ACRE	$200.00	$7,200		B.C.H
EROSION CONTROL/MAINTENANCE	36	ACRE	$225.00	$8,100		B.C.H
GENERAL REPAIRS	2500	ACRE	$3.25	$8,125		B.C.H
METHANE MONITORING	1	LS	$5,000.00	$5,000		MPI
SUBTOTAL					$28,985	
CONTINGENCY (15%)				$4,348		
TOTAL					$33,333	

NOTE: THE PRESENT WORTH OF THE TOTAL OPERATION AND MAINTENANCE COSTS OVER 30 YEARS AT 10% INTEREST IS APPROXIMATELY $335,000.

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 4A

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$8.00	$24,000		A
ACCESS GATES	3	EA	$2,000.00	$6,000		A
ACCESS ROADS	1000	LF	$10.00	$10,000		A
DIVERSION CHANNELS	5700	LF	$3.00	$17,100		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$25,000.00	$25,000		A
CLEARING AND GRUBBING	36	ACRE	$1,000.00	$36,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.30	$8,700		A,C
SOIL FILL (3% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	925000	CY	$4.50	$4,162,500		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$4.50	$130,500		A,B
PIPE VENTS	40	EA	$400.00	$16,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$750.00	$11,250		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
FLEXIBLE MEMBRANE (30 MILS)	1570000	SF	$0.33	$518,100		D,E
LOW PERMEABILITY MATERIAL (12")						
HAULAGE, PLACEMENT AND COMPACTION	58000	CY	$6.00	$348,000		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$12.00	$696,000		B,C
LATERAL PIPE DRAINS	10000	LF	$2.50	$25,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
COVER SOIL (48")						
EXCAVATION, HAULAGE AND COMPACTION	230000	CY	$4.50	$1,035,000		A,F
REVEGETATION	36	ACRE	$1,000.00	$36,000		A,B,C
					$7,743,860	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$387,193	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$232,316	G
ENGINEERING (10%)			10%		$774,386	G
CONTINGENCY (15%)			15%		$1,161,579	G
TOTAL					$10,299,334	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 4A

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$11.00	$33,000		A
ACCESS GATES	3	EA	$3,150.00	$9,450		A
ACCESS ROADS	1000	LF	$50.00	$50,000		A
DIVERSION CHANNELS	5700	LF	$6.50	$37,050		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$50,000.00	$50,000		A
CLEARING AND GRUBBING	36	ACRE	$1,500.00	$54,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.49	$14,210		A,C
SOIL FILL (3% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	925000	CY	$7.09	$6,558,250		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$12.00	$348,000		A,B
PIPE VENTS	40	EA	$500.00	$20,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$1,000.00	$15,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
FLEXIBLE MEMBRANE (30 MILS)	1570000	SF	$0.45	$706,500		D,E
LOW PERMEABILITY MATERIAL (12")						
HAULAGE, PLACEMENT AND COMPACTION	58000	CY	$12.00	$696,000		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$21.00	$1,218,000		B,C
LATERAL PIPE DRAINS	10000	LF	$3.50	$35,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
COVER SOIL (48")						
EXCAVATION, HAULAGE AND COMPACTION	230000	CY	$10.00	$2,300,000		A,F
REVEGETATION	36	ACRE	$1,500.00	$54,000		A,B,C
					$12,994,170	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$649,709	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$389,825	G
ENGINEERING (10%)			10%		$1,299,417	G
CONTINGENCY (15%)			15%		$1,949,126	G
TOTAL					$17,282,246	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 4A

30-Aug-83

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
SITE MAINTENANCE						
ANNUAL INSPECTION	1	YR	$560.00	$560		B,C,H
SITE MOWING/REVEGETATION	36	ACRE	$200.00	$7,200		B,C,H
EROSION CONTROL/MAINTENANCE	36	ACRE	$225.00	$8,100		B,C,H
GENERAL REPAIRS	2500	ACRE	$4.80	$12,000		B,C,H
METHANE MONITORING	1	LS	$5,000.00	$5,000		MPI
SUBTOTAL					$32,860	
CONTINGENCY (15%)				$4,929		
TOTAL					$37,789	

NOTE: THE PRESENT WORTH OF THE TOTAL OPERATION AND MAINTENANCE COSTS OVER 50 YEARS AT 10% INTEREST IS APPROXIMATELY $380,000.

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 4B

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$8.00	$24,000		A
ACCESS GATES	3	EA	$2,000.00	$6,000		A
ACCESS ROADS	1000	LF	$10.00	$10,000		A
DIVERSION CHANNELS	5700	LF	$3.00	$17,100		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$25,000.00	$25,000		A
CLEARING AND GRUBBING	36	ACRE	$1,000.00	$36,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.30	$8,700		A,C
SOIL FILL (3% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	925000	CY	$4.50	$4,162,500		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$4.50	$130,500		A,B
PIPE VENTS	40	EA	$400.00	$16,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$750.00	$11,250		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
FLEXIBLE MEMBRANE (30 MILS)	1570000	SF	$0.33	$518,100		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT AND COMPACTION	115000	CY	$6.00	$690,000		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$12.00	$696,000		B,C
LATERAL PIPE DRAINS	10000	LF	$2.50	$25,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.15	$235,500		D,E
COVER SOIL (48")						
EXCAVATION, HAULAGE AND COMPACTION	230000	CY	$4.50	$1,035,000		A,F
REVEGETATION	36	ACRE	$1,000.00	$36,000		A,B,C
					$8,085,860	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$404,293	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$242,576	G
ENGINEERING (10%)			10%		$808,586	G
CONTINGENCY (15%)			15%		$1,212,379	G
TOTAL					$10,754,194	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 4B

30-Aug-88

CAPITAL COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
DIRECT CAPITAL COSTS						
LAND AND SITE DEVELOPMENT COSTS						
ACCESS CONTROL (FENCING)	3000	LF	$11.00	$33,000		A
ACCESS GATES	3	EA	$3,150.00	$9,450		A
ACCESS ROADS	1000	LF	$50.00	$50,000		A
DIVERSION CHANNELS	5700	LF	$6.50	$37,050		C
REMEDIAL ACTION CONSTRUCTION COSTS						
MOBILIZATION/DEMOBILIZATION	1	LS	$50,000.00	$50,000		A
CLEARING AND GRUBBING	36	ACRE	$1,500.00	$54,000		A,B,C
GRADE & COMPACT SUBBASE (6")	29000	CY	$0.49	$14,210		A,C
SOIL FILL (3% SLOPE)						
EXCAVATION, HAULAGE AND COMPACTION	925000	CY	$7.09	$6,558,250		A
GAS CONTROL						
GAS LAYER						
SAND (6")						
EXCAVATION, HAULAGE AND COMPACTION	29000	CY	$12.00	$348,000		A,B
PIPE VENTS	40	EA	$500.00	$20,000		A,C
GAS BARRIER (10 FT DEEP)						
TRENCHING	6500	CY	$3.00	$19,500		B,C
BACKFILL MATERIAL	6500	CY	$13.00	$84,500		B,C
PIPING	7000	LF	$5.00	$35,000		B,C
SYNTHETIC MEMBRANE	63800	SF	$0.45	$28,710		B,C
GAS MONITORS	15	EA	$1,000.00	$15,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
FLEXIBLE MEMBRANE (30 MILS)	1570000	SF	$0.45	$706,500		D,E
LOW PERMEABILITY MATERIAL (24")						
HAULAGE, PLACEMENT AND COMPACTION	115000	CY	$12.00	$1,380,000		A,F
LATERAL DRAINAGE LAYER						
SAND (12")						
EXCAVATION, HAULAGE AND COMPACTION	58000	CY	$21.00	$1,218,000		B,C
LATERAL PIPE DRAINS	10000	LF	$3.50	$35,000		A,C
GEOTEXTILE (FILTER FABRIC)	1570000	SF	$0.20	$314,000		D,E
COVER SOIL (48")						
EXCAVATION, HAULAGE AND COMPACTION	230000	CY	$10.00	$2,300,000		A,F
REVEGETATION	36	ACRE	$1,500.00	$54,000		A,B,C
					$13,678,170	
INDIRECT CAPITAL COSTS						
QUALITY ASSURANCE (5%)			5%		$683,909	G
PERMITTING, LICENSING AND LEGAL (3%)			3%		$410,345	G
ENGINEERING (10%)			10%		$1,367,817	G
CONTINGENCY (15%)			15%		$2,051,726	G
TOTAL					$18,191,966	

KUMMER SANITARY LANDFILL
SOURCE CONTROL FEASIBILITY STUDY
ALTERNATIVE 4B

30-Aug-88

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATE

ITEM	QUANTITIES AMNT	UNIT	UNIT PRICE	SUBTOTAL	EXTENDED SUBTOTAL	SOURCE
SITE MAINTENANCE						
ANNUAL INSPECTION	1	YR	$560.00	$560		B,C,H
SITE MOWING/REVEGETATION	36	ACRE	$200.00	$7,200		B,C,H
EROSION CONTROL/MAINTENANCE	36	ACRE	$225.00	$8,100		B,C,H
GENERAL REPAIRS	2500	ACRE	$5.20	$13,000		B,C,H
METHANE MONITORING	1	LS	$5,000.00	$5,000		MPI
SUBTOTAL					$33,860	
CONTINGENCY (15%)				$5,079		
TOTAL					$38,939	

NOTE: THE PRESENT WORTH OF THE TOTAL OPERATION AND MAINTENANCE COSTS OVER 30 YEARS AT 10% INTEREST IS APPROXIMATELY $390,000.

ATTACHMENT 4

Current Minnesota Rules
for Solid Waste Disposal

X. When disposed of at a sanitary landfill, certain demolition and construction type wastes may be disposed of in a separate area, as specified by the director.

Y. The permittee shall properly complete the agency operational report form and submit it monthly to the agency, whether or not the permitted landfill is yet constructed or whether or not it is in operation.

Z. Within one month after final termination of a site, or a major part thereof, the area shall be covered with at least two feet of compacted earth material, graded to a minimum two percent slope to promote surface water runoff without excessive erosion.

The finished surface of the filled area shall be covered and maintained with adequate top soil and seeded to provide suitable vegetation immediately upon completion, or immediately in the spring on areas terminated during winter conditions. If necessary, seeded slopes shall be covered with straw or similar material to prevent erosion.

Prior to completion of a sanitary landfill site, the agency shall be notified in order that a site investigation may be conducted by the agency staff before earth moving equipment is removed from the property.

After completion of a sanitary landfill site, a detailed description, including a plat, shall be recorded with the county register of deeds. The description shall include general types and location of wastes, depth of fill, and other information of interest to future land owners.

If the completed site is to be cultivated, the integrity of the finished surface shall not be disturbed by agricultural cultivation activities. If cultivated, a sufficient depth of cover material to allow cultivation and to support vegetation shall be maintained.

Statutory Authority: *MS s 116.07 subd 4*

7035.1800 PERMIT APPLICATION AND REQUIRED PLANS FOR LANDFILLS.

Plans, including a permit application, report, and drawings shall be prepared by a registered engineer of Minnesota. Three complete sets of the plans shall be submitted to the agency. The submitted plans shall include the following:

A. A completed permit application form.

B. An engineering report including:

(1) General information;

(2) Site analysis including consideration of each item in part 7035.1600 along with data and supplementary reports, including soil boring data and a hydrogeologic study. Attention to this requirement must include consideration of surface features, underground formations, soil boring data from soil borings of which at least one is to a minimum depth of 50 feet below proposed excavation and lowest elevation of the site, water table profile, direction of underground water flow, initial quality of water resources in the potential zone of influence of the landfill, use of water resources in the potential zone of influence of the landfill, need and availability of cover material, and existing refuse deposits. Also considered shall be climate, average rates of precipitation based on average monthly rates from records of rain gauge stations, evapotranspiration, runoff, and infiltration;

(3) Proposed operating procedures including consideration of each item in part 7035.1700;

(4) Equipment to be used for operation of the site.

administrative Record Index
not included.

limits for individual substances under items E, F and H. The additive carcinogenicity or toxicity must be computed using the approach given in "Guidelines for the Health Risk Assessment of Chemical Mixtures," *Federal Register*, Volume 51, pages 34014-34025, September 24, 1986. Where quantification using this approach is feasible, the commissioner may require response actions if the sum total risk of consuming the water over a lifetime would exceed either 2.5 additional cases of cancer in a population of 1,000,000 persons or for noncarcinogens, 25 percent of the acceptable concentration for long-term consumption.

Subp. 5. **Design requirements.** The design requirements for a mixed municipal solid waste land disposal facility are as follows:

A. The owner or operator must develop an engineering report for the site. The report must include specifications for site preparation. The report shall be submitted with the final permit application required under part 7001.3300. These specifications as they relate to phase development of the facility must be established in the engineering report. Site preparations include clearing and grubbing for disposal areas and building locations, topsoil stripping and storage, cover material excavation, other excavations, berm construction, drainage control structures, leachate collection and treatment system, ground water monitoring system, gas monitoring and collection system, entrance and access roads, screening, fencing, and other special design features.

B. The owner or operator must develop the site in phases. Each phase must contain individual cells that will provide for filling in a manner to achieve final waste elevations as rapidly as possible. The phases must be designed and constructed to minimize moisture infiltration into the fill areas while maintaining stable slopes and appropriate operating conditions. The owner or operator must consider seasonal phases in order to accommodate the differences between wet and dry and warm and cold weather operations. The owner or operator must bring each phase to the final waste contours, as shown on the ultimate site development plan, and close the phase according to the approved facility closure plan.

C. Any new fill area at a land disposal facility must be located at least 200 feet from the nearest property line, unless otherwise approved by the commissioner based on existing filling procedures, existing site structures, the facility design, compliance boundaries, and existing land restrictions.

D. The owner or operator must divert surface water drainage around and away from the site operating area. A drainage control system, including changes in the site topography, ditches, berms, sedimentation ponds, culverts, energy breaks, and erosion control measures, must take into consideration at least the following features:

(1) the expected final contours for the site and the planned drainage pattern;

(2) the drainage pattern of the surrounding area and the possible effects on and by the regional watershed;

(3) the need for temporary structures as filling progresses at the site;

(4) the base of each fill area and the top of each lift graded at a minimum two percent slope; and

(5) the area's ten-year, 24-hour rainfall.

E. The owner or operator must design and maintain slopes and drainageways to prevent erosion, particularly of liner and final cover materials. Slopes greater than 200 feet long must include diversion drainageways unless the commissioner approves a greater distance based on sedimentation run-off calculations, proposed design features and sedimentation control devices. Where water runs off top slopes onto steeper side slopes, the owner or operator must evaluate the need for drainageways around the perimeter of the top slope and flumes or drop structures to prevent erosion of the cover. Drainageways must include energy breaks and concrete or rip rap reinforcement necessary to prevent erosion.

F. The owner or operator must provide a sediment settling pond if run-off would otherwise carry excessive sediment off the facility property. The commissioner may require monitoring of water quality within or beneath a sedimentation pond and corrective actions if adverse water quality effects are detected.

G. The final contours for the fill area must be a minimum three percent and a maximum 20 percent slope unless the commissioner approves other contours based on existing site topography, design plans, and operating conditions.

H. The facility design must include:

(1) a cover system in accordance with subpart 6;

(2) a liner system in accordance with subpart 7;

(3) a leachate collection and treatment system in accordance with subpart 9;

(4) a water monitoring system in accordance with subpart 10; and

(5) a gas monitoring and collection system in accordance with subpart 11 unless determined to be unnecessary by the commissioner based on the location, waste characteristics, and site characteristics.

Subp. 6. **Intermittent, intermediate, and final cover system.** The owner or operator of a mixed municipal solid waste land disposal facility must design and maintain a cover system capable of minimizing infiltration of precipitation into the fill

preventing surface water ponding on fill areas, controlling gas movement, preventing erosion of surface and side slopes, reducing wind erosion and wind blown litter, minimizing the creation and movement of dust, retaining slope stability, reducing effects of freeze-thaw and other weather conditions, maintaining vegetative growth while minimizing root penetration of the low-permeability cover layer, and discouraging vector and burrowing animal intrusion into the site. A complete cover system must consist of intermittent, intermediate, and final covers as outlined in items A to E.

A. The owner or operator must place an intermittent cover upon all exposed solid waste in accordance with the approved operation and maintenance manual for the site. The owner or operator shall submit to the commissioner for approval a proposed cover system that addresses the frequency and depth of placement and the material to be used as cover. The frequency of placement may be no less than once per week. The cover depth must be sufficient to cover the waste completely and must be at least six inches if soil or similar material is used. The commissioner, in approving the proposed cover system, must consider the characteristics of the proposed cover material, the characteristics of the solid waste, the leaching potential of the solid waste, the design and operation of the facility, and the potential for nuisance conditions if other than daily cover is proposed.

B. The owner or operator must place intermediate cover on all filled surfaces of the facility where no additional solid waste will be deposited within 30 days. The intermediate cover must consist of compacted material of sufficient depth, at least 12 inches if soil or similar material is used, to cover the waste completely, and graded to prevent surface water ponding.

C. The owner or operator of an existing mixed municipal solid waste land disposal facility must comply with the final cover requirements of subitems (1) to (4) if, within 18 months after the effective date of parts 7035.2525 to 7035.2815, waste will no longer be received and the facility will be closed.

(1) The final cover system must be compatible with the end use for the site.

(2) The final cover system must be graded to prevent surface water ponding and must have a minimum slope of two percent and a maximum slope no greater than 25 percent.

(3) The final cover system must consist of a barrier layer at least 24 inches thick of materials having a permeability not greater than 2×10^{-6} centimeters per second overlain by 12 inches of material of which at least six inches is topsoil capable of sustaining a vegetative cover. A barrier consisting of synthetic materials at least 30/1000 of an inch thick may be used in place of the barrier layer described above.

(4) The vegetative cover must consist of shallow-rooted perennial grasses or other suitable vegetation that will not penetrate the barrier layer.

D. The owner or operator of a new mixed municipal solid waste land disposal facility or an existing facility or portions thereof that will close or reach final permitted waste elevations more than 18 months after the effective date of parts 7035.2525 to 7035.2815 must comply with the requirements of subitems (1) to (9).

(1) The final cover system must be compatible with the end use for the site.

(2) The final cover system must be designed and constructed to contain or reject at least 90 percent of the precipitation falling on the system.

(3) A final cover system comprised of soils or amended soils must consist of at least three layers: a barrier layer, a drainage layer, and a top layer. The barrier layer must be at least 24 inches thick if it consists of soils or amended soils. The drainage layer must be at least six inches thick. The top layer must be at least 18 inches thick, of which at least six inches is topsoil, and of sufficient depth to contain the vegetative roots and have an available water-holding capacity to promote vegetative growth.

(4) The barrier layer must have a maximum permeability no greater than 2×10^{-6} centimeters per second.

(5) A synthetic membrane may be used as the barrier layer. The membrane must be at least 30/1000 of an inch thick and meet the physical property standards for the material type developed by the National Sanitation Foundation and reproduced in the United States Environmental Protection Agency Manual, "Lining of Waste Impoundment and Disposal Facilities", SW-870, March 1983, Office of Research and Development, Cincinnati, Ohio.

(6) The layer of topsoil must be capable of sustaining vegetative cover consisting of shallow-rooted perennial grasses or other suitable vegetation that will not penetrate the barrier layer.

(7) In designing the drainage for the final cover system, the owner or operator must consider the need for drainage ditches.

KEY: PROPOSED RULES SECTION — Underlining indicates additions to existing rule language. ~~Strike outs~~ indicate deletions from existing rule language. If a proposed rule is totally new, it is designated "all new material." ADOPTED RULES SECTION — Underlining indicates additions to proposed rule language. ~~Strike outs~~ indicate deletions from proposed rule language.

pipes, and collection areas to prevent erosion and excessive sediment movement off site. The owner or operator must also co[illegible] design and construction techniques needed to maintain the drainage layer in place on the barrier layer.

(8) The barrier layer must be placed upon a buffer material covering the waste to protect the barrier layer from damage.

(9) The owner or operator must grade the final cover system to achieve a minimum three percent and a maximum 20 percent slope, unless the commissioner approves otherwise. The commissioner's approval must consider the ability of the proposal to minimize infiltration and prevent erosion, the design and operational specifications, and the ultimate use for the site. The final cover system must maximize surface water run-off and prevent ponding of surface water.

E. The owner or operator must place all cover material for the barrier, buffer, and drainage layers in lifts of no more than six inches and compact the lifts within zero to five percent of optimum moisture content to achieve 95 percent Standard Proctor of maximum density according to the compaction test of subpart 8. The owner or operator must not compact the uppermost six inches to this specification.

Subp. 7. **Liner requirements.** Any previously unfilled portion of an existing mixed municipal solid waste land disposal facility or any portion of a new mixed municipal solid waste land disposal facility must be lined. An extension of 18 months from the effective date of parts 7035.0300 to 7035.2875 may be granted by the commissioner to the owner or operator of an existing mixed municipal solid waste land disposal facility provided the owner or operator shows that the liner is unnecessary for that time based on: subsurface geologic conditions; ground water and surface water flow patterns; ground water and surface water quality; depth to ground water; distance to surface water; remaining site capacity; design and construction techniques to be used to mitigate leachate generation; and other site conditions that exist and will minimize impacts on the environment.

A liner is not required for existing disposal areas at existing mixed municipal solid waste land disposal facilities that will be expanded vertically. However, a permit for a vertical expansion may be granted by the commissioner only if the owner or operator shows that the expansion will not increase the potential for harm to human health or the environment. The owner or operator shall submit to the commissioner an engineering and hydrogeologic report containing a detailed analysis of the impact the expansion would have on the environment and human health. The report must also contain the design and construction modifications to be used at the facility to minimize impacts on the environment. The report must include a hydrogeologic evaluation as outlined in subpart 3; a feasibility study on minimizing leachate generation, controlling leachate movement, and on treating ground water and surface water pollution; an evaluation of long-term monitoring; and an appropriate adjustment to the financial instruments in place for the facility.

The liner installed at a mixed municipal solid waste land disposal facility must comply with the requirements of items A [illegible]. The lined portion of the disposal area must be separated from any existing fill area by low-permeability material to the extent practicable, be designed to collect the additional water movement from the old fill area to the new fill area, and prevent movement of water from the new fill area to the old fill area.

A. The liner system in combination with the cover system must achieve an overall site efficiency of 98.5 percent collection or rejection of the precipitation that falls on the disposal area and minimize the amount of leachate leaving the fill site to the soil and ground water system below the site.

B. The liner system must be compatible with the waste and leachate.

C. The liner must maintain its integrity for the operating life of the facility and the postclosure care period.

D. The liner system must consist of at least the following:

(1) a smooth, stable subgrade for placement of the barrier liner by means of the placement of protective material over the existing subgrade, the removal of abrasive objects, organic matter, and vegetation in the subgrade, and regrading;

(2) a barrier liner capable of containing leachate generated at the facility and surface water that has come in contact with waste; and

(3) a drainage layer above the barrier liner to rapidly convey surface water and leachate from the fill area, and to protect the barrier layer from puncture or other disturbances that might disrupt the integrity of the barrier liner.

E. A natural soil barrier liner must be at least four feet thick. A synthetic membrane must be at least 60/1000 of an inch thick for an unreinforced membrane or 30/1000 of an inch thick for a reinforced membrane. A synthetic membrane must meet the specifications of the National Sanitation Foundation, Standard Number 4, Flexible Membrane Liners, November 1983, Ann Arbor, Michigan. The synthetic membrane must be placed over a natural soil barrier liner at least two feet thick. The drainage layer must consist of at least 12 inches of suitable soil material or an equivalent synthetic material.

F. The barrier liner must have a permeability no greater than 1×10^{-7} centimeters per second. The drainage layer must have a permeability of 1×10^{-1} centimeters per second or greater throughout.

G. The base of the liner must be graded to a minimum two percent and a maximum ten percent slope and the side slopes must be no steeper than 25 percent.